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ALLEGHENY AND WASHINGTON COUNTIES

PENNSYLVANIA

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PENNSYLVANIA
GEOLOGICAL SURVEY
FOURTH SERIES
BULLETIN M 29

McDONALD AND ADJACENT OIL FIELDS

ALLEGHENY AND WASHINGTON COUNTIES PENNSYLVANIA

PART I

GEOLOGY

By

A. I. INGHAM

PART II

SECONDARY RECOVERY

By

E. M. TIGNOR and W. M. NABORS

DEPARTMENT OF INTERNAL AFFAIRS
WILLIAM S. LIVENGOOD, JR., *Secretary*

TOPOGRAPHIC AND GEOLOGIC SURVEY
S. H. CATHCART, *Director*

1949

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by A. I. Ingham

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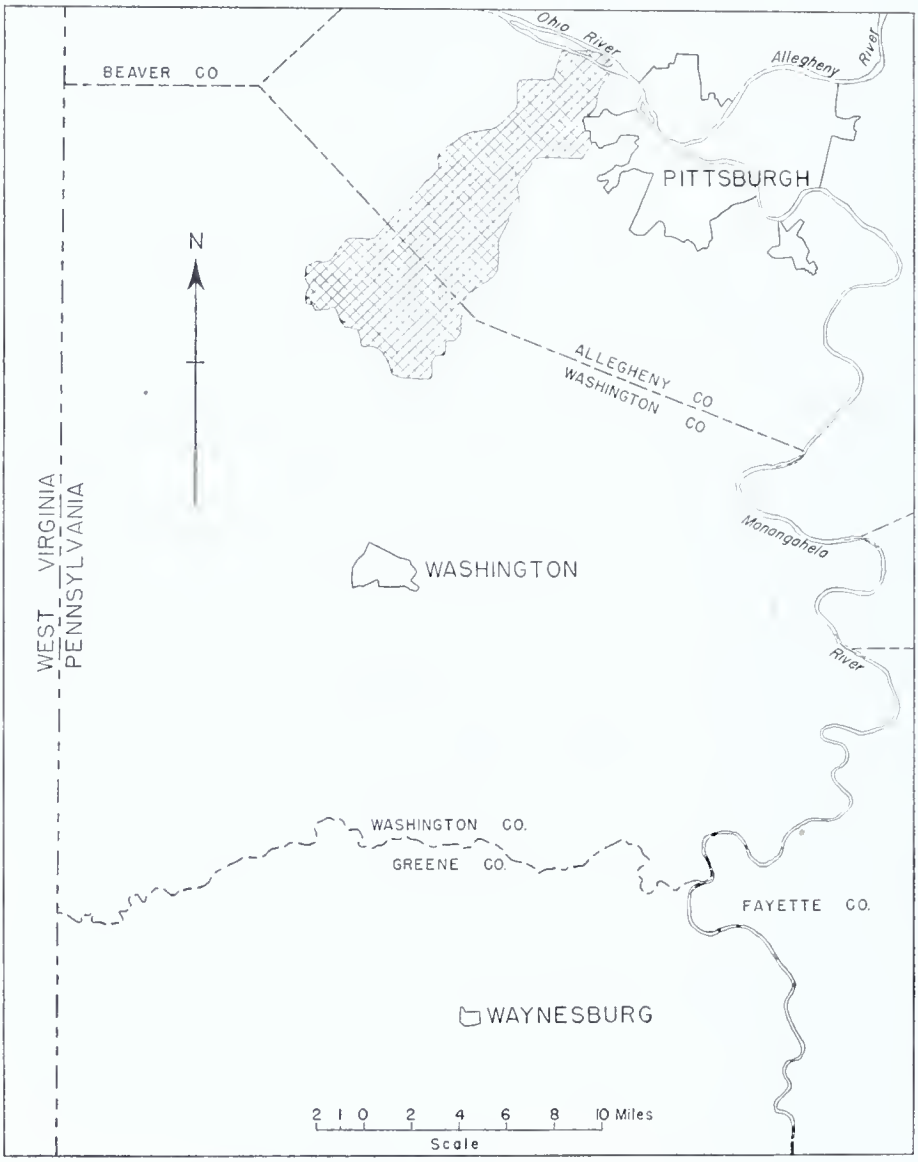

FIGURE 1. Index map showing location of area.

PART I

GEOLOGY OF THE McDONALD AND ADJACENT OIL FIELDS ALLEGHENY AND WASHINGTON COUNTIES PENNSYLVANIA

BY

ALBERT I. INGHAM[1]

Introduction

The area included in this investigation is located in southwestern Allegheny and northern Washington Counties, Pennsylvania (fig. 1). It includes five oil fields: McDonald, McCurdy, Venice, Hopper, and Moon Run-Crafton (fig. 2). The production limits of these fields are largely arbitrary since, for the most part, no distinct geological boundaries separate one field from another. For instance, the Hopper field is a northeast extension of the Venice field, and both form a continuous Fourth sand producing area. Likewise, the McDonald and McCurdy fields constitute a field unit which is productive chiefly from the Gordon and Fifth sands.

Field names were assigned to apparently distinct areas as new discoveries were made. Subsequent drilling in the various areas, however, extended the productive limits until finally one field merged with another. Some of the names are, then, superfluous in the strict use of the term "field." Because of long continued usage in the industry and in the literature, however, these various field names are retained in this report.

PURPOSE

Most of the previous oil and gas investigations of the Survey have embraced fifteen-minute quadrangle areas. Since this study treats of a series of fields, the outline of the area described is defined by the limits of the various fields or pools.

One of the prime objects in undertaking this investigation was to assemble geologic data pertinent to the secondary recovery of oil. Secondary methods, which have proved so successful in other areas, have been little used in southwestern Pennsylvania, but it is highly probable that large quantities of oil, not recoverable by primary production techniques, remain in the producing sands of the fields included in this study. The secondary recovery of oil by gas injection is being employed

[1] Geologist, Pennsylvania Topographic and Geologic Survey.

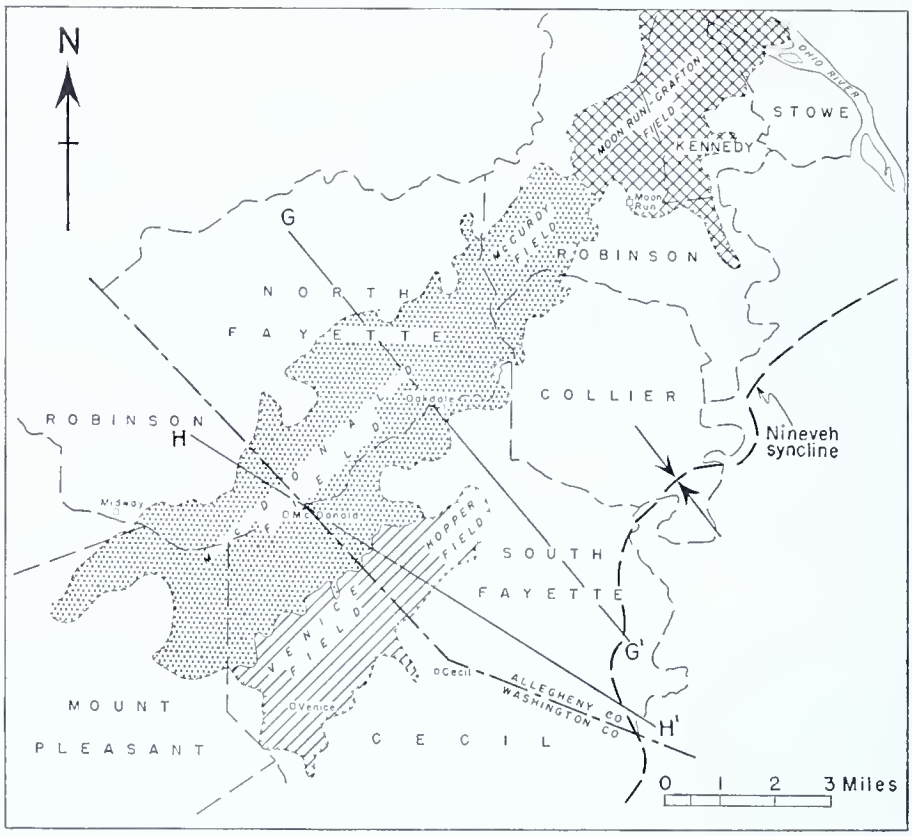

Figure 2. Index map showing oil fields. Cross sections GG′ and HH′ are shown on Figure 3.

in the southern part of the McDonald field. In Part II of this report, E. M. Tignor and W. M. Nabors of the United States Bureau of Mines, describe this project.

In addition to the more immediate need—that of obtaining additional oil from the sands now productive—a second purpose of these oil and gas investigations is to obtain clearer ideas concerning the geological factors relating to the accumulation and occurrence of oil and gas. A better understanding of these factors should aid both in the search for new fields and in the extension of older fields.

These studies may possibly serve in part to guide exploration of the deeper formations. The Survey's approach to exploration of the deep (Onondaga and older) strata is being made principally through study of well samples collected from deep tests in various parts of the state and detailed investigations of surface exposures of the older Paleozoic formations. Structurally, however, the relationships as shown by the Upper Devonian and younger strata of the shallow producing area in Pennsylvania, may be indicative of deeper structure. Regional data reveal that such interpretations must be used with caution since structures may shift laterally; they may become larger, smaller, or nonexistent with depth. The shallower structural details, nevertheless, may serve to delineate broadly those areas which merit further and more detailed exploratory studies.

METHOD OF INVESTIGATION

The collection of data comprises the initial step in the oil and gas investigations of the Survey. This includes the gathering of maps, well records, samples, and various data; interviews with operators, field men, and property owners; determination of well locations and elevations; and reconnaissance observations on the surface geology.

Maps furnished by various companies, individuals, and from published sources vary in accuracy. They, nevertheless, indicate areas and tracts which have been drilled and serve as a starting point for a field check. The entire area included in this study was checked in the field. The location of all producing and abandoned wells was accurately spotted using aerial photographs. In many instances, no vestige of a well remains, and it is necessary either to accept the site as pointed out by old residents familiar with the area or to use the location indicated on the various maps.

Well elevations were determined by plane table-alidade and Paulin altimeter methods. A plane table-alidade survey was first made of a number of roads in the area to provide a network of reliable elevations which served as take-off points for the altimeter survey. The single instrument altimeter method was used and, where practical, check readings on known elevations were taken at intervals not to exceed one hour and a half. Both temperature and diurnal barometric corrections were applied to all altimeter surveys. In a few instances, large differences were found between elevations determined in this investigation and those determined by M. J. Munn and others (1911) in their Carnegie quadrangle study. Although many of Munn's elevations were determined with a spirit level, it appears probable that there was some confusion concerning well numbers; hence an elevation for a particular well was probably applied to geologic data for another well, and the resulting structural map which accompanies the Munn (1911, pl. 5) report undoubtedly errs in various places.

The cultural features on the base maps accompanying this report were taken from the fifteen minute Carnegie, Burgettstown, and Sewickley quadrangle maps, surveyed in the period 1903-1906. Also, within the outlines of this investigation, road and highway changes or additions, as shown by aerial photographs taken in 1938 and 1939, were made on the maps. Property lines were obtained from the Washington County office of the United States Department of Agriculture and from the Allegheny County Planning Commission. These properties are as of the middle and late 1930's. It was not considered practical to show the smallest tracts, and in general none smaller than 10 acres are outlined. In various areas, where neither of the above offices had property information, older published data has been used. Because of the number of relatively small, irregularly-shaped tracts in the area and the necessity of showing wells and geologic data, property names have been omitted from the base maps. Carnegie and Burgettstown quadrangle maps showing property lines and land owners will be issued separately from this report and may be obtained from the Survey.

A convenient grid-index method of locating and listing individual wells, adopted in the North Strabane report (Fettke, Stephenson, and

Tignor 1946), is used on Plate 1. This map has been divided into one minute rectangles, which are numbered consecutively from 1 to 13 north to south. From west to east the tiers in the Burgettstown quadrangle appearing on maps of this report are lettered K to O, the letter A being assigned to the westernmost tier of the quadrangle. From west to east in the Carnegie quadrangle, the tiers are lettered A to K. Within each rectangle each well is assigned a number. In the appendix to this report there are two lists of wells—one lists wells by individual rectangles, a second, alphabetically by surname. If the farm name of a particular well is desired, the name can be quickly obtained from the first list; if the farm name is known and the location of the well is desired, the second list is used. Further details and examples to illustrate the use of this grid-index arrangement are given in the appendix.

History

Historically, this area is most interesting since it includes the famous McDonald field, the second largest oil field in Pennsylvania and one of the most prolific in the entire Appalachian basin. Together with McDonald, the area also includes the McCurdy, Moon Run-Crafton, Venice, and Hopper fields, all discovered during the period 1888 to 1896.

The first production was discovered in August, 1886 in a test drilled on the Jane Riddle farm, just southwest of the town of Moon Run. This well, the Philadelphia (Equitable) Gas Company, Riddle No. 1, was a small oil producer and was abandoned after a short period. It aroused little interest, and it was not until a year later, in September, 1887, that J. H. Galey, et al., drilled Bragdon No. 1 on the southeast end of Neville Island. Like the Riddle test, Bragdon No. 1 was not a large well. Neither provided sufficient incentive to encourage further drilling; much greater financial reward was offered in the vicinity of the newly-discovered fields near Washington, Pennsylvania, and in Allegheny County, north of the Ohio River. In November, 1888, however, the Fort Pitt Gas Company drilled their Phelps No. 1, just east of the town of Moon Run. This was probably the discovery well of the Moon Run-Crafton field. Although not a large well, it attracted considerable attention and, as a result, the area between Moon Run, Chartiers Creek on the east, and Ohio River on the north, was extensively drilled in 1889 and 1890.

During the peak of the development in the Moon Run-Crafton field, Patterson and Jones located a test on the McCurdy farm, approximately one-half mile southeast of the town of Gayly. This test, McCurdy No. 1, discovery well of the "McCurdy field," was completed in the Fifth sand on October 15, 1890, with an initial production of about 600 barrels of oil per day. According to the Oil City Derrick, "this unexpected find created no little sensation, both on account of the good showing and the formation in which the oil had been encountered. This was the first well in this locality in which oil had been obtained from the Fifth sand." The McCurdy well produced several hundred barrels a day for some months.

Eight miles to the southwest of the McCurdy discovery, the Royal Gas Company commenced a well in the summer of 1890, two miles

west and a little north of the town of McDonald, on the K. Noble McDonald farm. This was completed as a light gas well from the Gordon sand. Moving east, they made a location on the Edward McDonald farm, one-half mile west of McDonald. This well was drilled to the Fifth sand and had an initial production of 12 barrels a day. After being shot, the daily production increased to 65 barrels. During subsequent cleanout operations in late 1890, the tools were stuck and the well was abandoned. The operators then moved back to the K. Noble McDonald well, deepened it, and obtained oil production from the Fifth sand. These two wells, K. Noble McDonald No. 1 and Edward McDonald No. 1, were the first producing wells in the McDonald field. The year 1890 ended with one well in the field producing, and one abandoned because of mechanical difficulties. Neither had unusually high productive capacities and they gave no hint of the prolific gushers to be drilled in the field in 1891.

The McDonald developments in the spring of 1891 centered around the town of McDonald where several good wells were completed during May and June. Town lot drilling was common, and before the close of the year at least 60 wells had been drilled in lots within the borough. Many of these were abandoned before the end of 1892.

Noteworthy among the McDonald field wells drilled during 1891 were two famous in Pennsylvania's oil history—Jennings, Galey, et al., Mathews No. 1, and Greenlee and Forst, Mevey No. 1. It is believed these two wells had the highest initial production of any drilled in the Appalachian basin.

The Mathews test was originally completed in May, 1891, producing approximately 30 barrels of oil per day from the Gordon sand. In the period July to October of that year it was deepened to the Fifth sand. The initial production from the Fifth sand was 40 barrels per hour. By successive deepenings into the sand, however, its output was increased until, by October 17, it was producing at a rate variously estimated at 500 to 860 barrels per hour. It did not continue to produce at this high rate but steadily declined, and on October 20[2] its output was 425 barrels per hour. By January, 1892, its hourly output had dropped further to 20 barrels. According to trade journal reports,[3] Mathews No. 1 produced in eight months (May to December, 1891) about 523,513 barrels of oil. Today, 58 years after being drilled, this remarkable well is still productive, making six barrels of oil per day.

Like Mathews No. 1, Greenlee and Forst, Mevey No. 1 (now called No. 17) was first completed in the Gordon sand, later deepened through the Fifth sand, and on October 4, 1891, began to produce at a rate of 750 barrels per hour. The consensus of opinion is that the Mevey well was initially more productive than the Mathews. The latter, however, had a more sustained production, its daily output now being approximately 25 times that of the Mevey well. Mevey No. 1 is still productive at the rate of 12 barrels per month. These two very large wells set productive records never attained before 1891 nor equalled since in the Appalachian area.

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[2] Oil City Derrick, October 20, 1891.

[3] Oil City Derrick, January 1, 1892.

The peak of the McDonald field development occurred during the fall of 1891. The intensity of development is revealed in the production figures[4]. The daily production for September 1, 1891, was 13,000 barrels of oil; for October 1, 40,000 barrels; for November 1, 77,000 barrels; and on November 5, McDonald reached its peak production—84,300 barrels of oil per day. The 306 wells which were drilled in the McDonald field to January 1, 1892, had an average initial per day production amounting to 334 barrels of oil.

The sudden increase in Pennsylvania oil production to an all time high of 31,424,000 barrels in 1891 may be attributed in great part to the many large wells completed in the McDonald field. This enormous production was not without its disadvantages to the operator, for the price of Pennsylvania oil dropped to an average of 56 cents a barrel in 1891, and fell further in 1892 to 50 cents, the lowest in the history of the Pennsylvania oil industry.

By the end of 1892 the limits of the McDonald field had been fairly well established, and its production had declined to approximately 18,000 to 21,000 barrels of oil per day. In 1893 there was considerable drilling south of the town of McDonald. In June of that year the Forest Oil Company discovered oil in the Fourth sand on the George Kelso farm, northeast of the town of Venice. This Fourth sand producing area, named the Venice field, also provided gas and oil from the Fifty Foot sand. The Venice field was actively drilled in 1894. The Hopper field, a small Fourth and Fifty Foot sand producing area and a northeastern extension of the Venice field, was developed largely during the period 1896 to 1899. According to Munn (1911) a well was drilled on the Joseph Campbell farm in this area in 1886 and recovered some oil, but it was "abandoned for want of a pipe line to transport the oil."

Since 1899, no new fields have been discovered in the area. Considerable deepening and drilling between producing wells was done just before and after World War I. Of late years, most of the activity has been confined to deepening wells to the Fifth sand, and a few small gas wells have been drilled in the outer portions of the area.

Topography

The area included in this report is in the Allegheny Plateau physiographic province. The region is hilly and has a maximum relief of approximately 730 feet from the highest elevations to the level of the Ohio River. Robinson Run, Millers Run, Chartiers Creek, and the Ohio River constitute the principal drainage. The first two streams flow north and east into Chartiers Creek which in turn drains into the Ohio River approximately two and three quarter miles northwest of the confluence of the Allegheny and Monongahela Rivers.

As mentioned by Shaw and Munn (1911) the profile of the drainage basins is unsymmetrical, the eastward or southeastward-facing slopes being much longer and more gradual than the west or northwest slopes. They suggest various explanations for this lack of symmetry, but rule out the possibility of the drainage pattern being influenced by geologic structure, because the streams "flow across anticlines and synclines alike." It appears to be more than coincidence, however, that the long

[4] Oil City Derrick, January 1, 1892.

southeast slopes are essentially in the direction of the dip, while the west or northwest facing escarpments along Robinson Run and Millers Run are the truncated edges of the Monongahela and Conemaugh formations. Structure, therefore, may play an important role in the development of this unsymmetrical topographic profile, although there may be other contributing factors.

STRUCTURE

The area described in this report is located in the western part of the Appalachian foreland. It lies from 4½ to 8 miles west of the axis of the Pittsburgh-Huntington synclinorium, which, in southwestern Pennsylvania, is represented by the Nineveh syncline.

The regional dip varies from 15 to 55 feet per mile, generally southeast toward the Nineveh syncline although in the Venice field area the dip is predominantly south into the Cross Creek syncline. Much of the producing area is on a broad, structural terrace (fig. 3, p. 7) east of which the beds dip more sharply toward the Nineveh syncline. This terrace is irregular, being interrupted by a number of large and small folds.

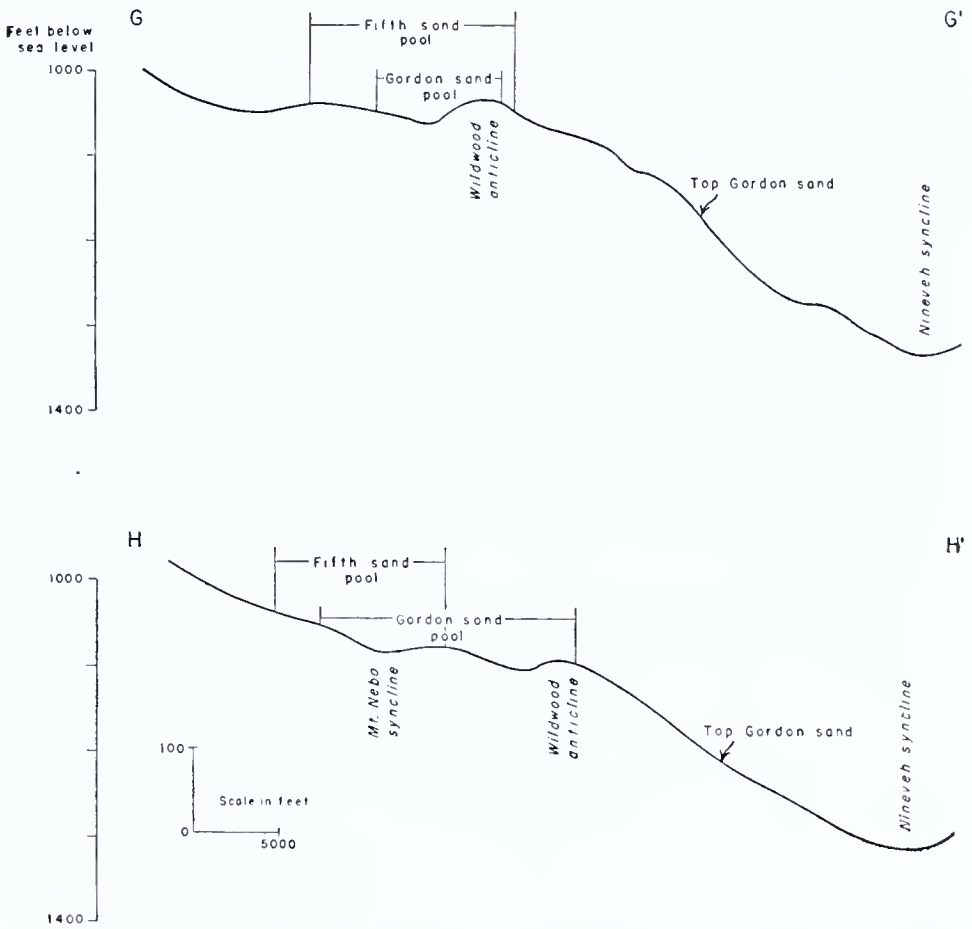

FIGURE 3. Cross sections GG' and HH' showing relation of the Gordon and Fifth sand oil pools to the structural terrace. Data outside area of this report from Griswold and Munn (1907) and Munn (1911). See Figure 2 for lines of section.

The above-described regional relationships are shown on Munn's structural map (1911, pl. 5). Details of the local structural features are described below.

FOLDING

As shown by the maps, Plates 2, 3, and 5, there are three prominent structures in the area: (1) Wildwood anticline, (2) Mt. Nebo syncline, and (3) Cross Creek syncline. The first two structures trend northeast, more or less parallel to the Appalachian structures to the east. They are terminated on the south by the Cross Creek syncline but are indicated on published maps (Sisler, 1932) to continue some miles to the north and northeast, the Wildwood anticline extending to northern Allegheny County, while the more extensive Mt. Nebo syncline probably connects with the Brady's Bend syncline of Butler and Clarion Counties.

The Cross Creek syncline is a so-called "cross fold" which trends north-northwest transverse to the prevailing Appalachian trend in southwestern Pennsylvania. It is just north of and parallel to a prominent anticlinal cross fold extending from Westland, northwest to Eldersville, Washington County. Griswold and Munn (1907, pl. 9) named a portion of this structure the Westland dome.

The two distinct structural trends within the producing area, namely, the northeast-trending Wildwood anticline and the Mt. Nebo syncline, and the northwest-trending Cross Creek syncline, were probably formed at different periods. It is thought that the northeast structures were formed during the Appalachian Revolution; the cross folds, however, probably originated earlier. Evidence to support this conclusion is found in Griswold and Munn's (1907) isopach studies of the Burgettstown quadrangle. Their isopach map of a portion of the Upper Devonian, Mississippian and Lower Pennsylvanian interval including the section between the base of the Pittsburgh coal to the top of Hundred Foot sand, shows a pronounced thinning over the Westland anticline, the isopach contours being essentially parallel to the structural contours. This stratigraphic-structure relationship suggests that the cross-folded Westland anticline was present as a positive element during a part or all of post-Hundred Foot sand to Lower Pennsylvanian time. There is no evidence to indicate that the structure was not in existence during all of Devonian or earlier periods. Lockett (1947) has suggested that northwest-southeast structures in eastern Ohio may have had their inception as early as Ordovician time.

The age of the cross trends is important for two reasons: First, if they were present as positive or negative features during the deposition of the Upper Devonian producing sands, they may have influenced the character of sedimentation in their vicinity. This will be fully discussed in the portion of this report dealing with the relation of oil and gas accumulation to structure. Second, the cross trends may have had some influence on deformation acting upon them. The Pittsburgh coal, Gordon, and Fifth sand structural maps (Pls. 2, 3, and 5) show that the Wildwood anticline and Mt. Nebo syncline, although aligned generally northeast, locally deviate to a north-south or northwesterly trend. These departures from the prevailing trend of Ap-

palachian structures in southwestern Pennsylvania possibly represent the modifying influence of pre-existing cross folds upon the late Paleozoic folding. It may be expected that the cross-folded trends, being at an oblique angle, or approximately parallel to the southeastern stress, would offer more resistance to deformation than would the undisturbed areas between the folds. The resultant structures, although generally northeast-trending, would have more or less sinuosity due to the buttress effect of the cross folds. The degree and character of these deviations would be proportional to the size, shape, orientation and spacing of the cross folds, as well as the magnitude and direction of the forces acting upon them.

Cross folds are more evident in the Burgettstown quadrangle and adjacent areas of West Virginia and Ohio. In the producing area described in this bulletin, however, the Cross Creek syncline is the only well-developed cross fold present. There is a suggestion that others, less strongly developed, have been obscured by late Paleozoic deformation which established the dominant northeast-southwest regional trends.

FAULTING

Subsurface faulting has not been recognized in the area, but the many coal-stripping operations in the area afford an excellent opportunity to observe surface structural features. Faults are common, although they all appear to be of small displacement and frequently die out within the space of a few feet vertically; they appear to be what has been called "intraformational contorted zones" (Fairbridge 1946). The character of much of this deformation is suggestive of disturbance prior to or during consolidation of the strata.

Several faults are exposed in a road cut on Route 978, one-half mile northwest of Oakdale. The first fault exposed, nearest Oakdale, has a strike of N. 30° E. and dip of 13° N.W. Approximately 50 feet beyond is a second fault striking as above, but dipping approximately 13° to the southeast. The two faults form a flat wedge, converging downward. The area in the wedge is severely crushed. There is some evidence that the fault planes flatten out and merge at the road level, but this could not be determined with certainty. Matching displaced beds could not be seen.

A second faulted area is exposed in a road cut 1.1 miles northeast of Oakdale on the road to Greggs. Two parallel faults are visible having a strike of N. 60° W. and a dip of 10° S.W. The total throw appears to be about 6 feet. East-northeast approximately 150 feet, another set of fractures is exposed. These are approximately perpendicular in strike to the first two faults, striking N. 10° E. and dipping in two directions, 43° S.E. and 50° N.W. They occur as many closely spaced fractures apparently of small displacement; slickensides are common on the fracture surfaces.

STRUCTURE MAPS

Four structural maps accompany this report. They are contoured on the (1) base of the Pittsburgh coal, (pl. 2), (2) top of the Gordon sand (pl. 3), (3) top of the Fourth sand (pl. 4), (4) top of the Fifth

sand (pl. 5). Although these maps, where contoured, show the major structural features, these features may be shifted, accentuated, or minimized from one horizon to another. A number of geologic factors influence the structural interpretation as revealed on the various contoured horizons. These include: (1) distribution and amount of contour data, (2) convergence between strata, (3) depositional and/or erosional irregularities effecting particular beds, (4) differential compaction, (5) in the case of the Pittsburgh coal, deposition on an undulating surface, and (6) as suggested in the North Strabane report (Fettke, et al., 1946, p. 25), the relative competency and vertical distribution of the various strata, for example, sandstone and shale, will influence the degree and character of folding in various parts of the stratigraphic section. Of all these factors, it is likely that point three, structural irregularities caused by depositional and/or erosional conditions, are particularly important in sand deposition. Waves and currents have, no doubt, played an important role in determining the configuration, size and shape of the various sand bodies. Structure, therefore, as revealed by the sands, will vary according to environmental conditions existing at the time of sand deposition. It follows that sands are not the best structural mapping units; the operator and driller, however, frequently failed to record geologic data on various other lithologic units which would afford a truer conception of the geologic structure than is shown by the sands.

Various comments and explanatory remarks concerning the four structural maps follow:

Contours on the base of the Pittsburgh coal (pl. 2) are drawn from surface and well log data. This coal is a convenient marker bed and is usually recorded on well logs. Some 2100 feet and at least one unconformity (Mississippian-Pennsylvanian), however, separate the coal from the shallowest main-producing sand—Gordon. It may be expected, therefore, that there would be some structural differences between the coal and the deeper Upper Devonian sands.

Contours on the Gordon sand structural map (pl. 3) are not extended northeast of southwestern Robinson township. In much of the remainder of this township and in portions of Collier, Stowe, and Kennedy Townships, the Gordon Stray and Gordon sands merge to form one sand body. In some of the better records, the correlative top of the Gordon sand can be closely estimated, even where the two sands merge; in many instances, however, there is insufficient control to determine the Gordon sand datum. The interval between the top of the two sands is usually greater than 20 feet, the contour interval of the Gordon structure map. Miscorrelations of the top of the Gordon sand, therefore, lead to considerable structural inaccuracy. Munn (1911) recognized that errors were introduced in his Gordon sand structural map due to the fact that the contour data in some areas represented the top of the Gordon Stray instead of Gordon sand. This should be borne in mind when Munn's map is used for interpreting local structural details, particularly in the northern portion of the Carnegie quadrangle.

The Fourth sand (pl. 4) is contoured only in the vicinity of the Venice and Hopper fields where it is the main-producing sand. Some

production is obtained from it in a portion of the Moon Run-Crafton field, but not enough data is available to permit drawing accurate structural contours on the Fourth sand in this area.

Of the three structure maps on Upper Devonian sands which are included in this report, the map showing the top of the Fifth sand (pl. 5) probably most closely represents the true structure. Considerable data on this sand is available, it is present throughout most of the area and is usually correctly logged by the driller.

RELATION OF OIL AND GAS ACCUMULATION TO STRUCTURE

The fields described in this report are typical stratigraphic trap types. The areas of oil accumulation correspond with the more porous and permeable portions of the sands. The outlines of production do not parallel structural contours, but are determined by the "effective permeability limits" of the reservoirs. Structure, however, in two, perhaps three, instances exerts a direct or indirect influence on oil and gas accumulation. First, structure appears to be dominant in controlling the localization of gas. Second, all of the Gordon and Fifth sand production of the field is found north of the Cross Creek syncline. Third, much of the Gordon and Fifth sand oil is located on the broad and irregular structural terrace (fig. 3, p. 7) northwest of the more steeply dipping strata adjacent to the Nineveh syncline (this can be observed on Munn's (1911, pl. 5) structural map of the Carnegie quadrangle).

With respect to the structure and areal distribution of the Gordon, Fourth, and Fifth sands, with few exceptions most of the gas has accumulated in three areas: (1) along the updip edge of the sands; (2) in the structurally higher areas within the sand bodies, and (3) along the downdip edge of the sands (pls. 3, 4, and 5). Its occurrence in (1) and (2) above is readily understandable, for gas will seek the structurally highest parts of a reservoir. It is less clear why it should accumulate along the downdip (structurally lowest) portion of the sands. Toward the edges of the sand bodies, however, the sands become more shaly and "tighter" and interfinger with shales and siltstones, so it is quite likely that local stratigraphic traps exist in the downdip areas which prevent updip migration of the gas.

The coincidence of the Cross Creek syncline with the southern productive limits of the Gordon and Fifth sands is particularly significant in light of the possibility that this syncline may have been in existence during the deposition of the Upper Devonian oil sands. Evidence that a structurally high cross fold located just south of the Cross Creek syncline may have been present during a part or all of post-Hundred Foot Upper Devonian, Mississippian and Pennsylvanian time has been cited previously. If the Cross Creek syncline was present as a negative feature during the deposition of the Upper Devonian sediments, it may have influenced the character of sedimentation in its vicinity. Studies by Trask (1932, 1939) and others have shown the interdependence between the character of sediments and the morphology of the depositional area—coarser material is frequently concentrated on the "highs," while the finer material is winnowed out by waves and currents and

carried down into the "lows." This influence of submarine topography on the lithology of sediments may explain the relationship between the Gordon and Fifth sand producing areas and the Cross Creek syncline. Although lithologic data on these sands is not detailed, sparse information indicates that they become finer grained south of the town of McDonald toward and in the Cross Creek syncline, suggesting that it existed as a low during deposition of the sands. The syncline served to concentrate the finer, "tighter," hence non-productive material in its vicinity, while the coarser, more permeable sands were deposited in the productive area.

This concept of the relationship of sedimentation to the morphology of the depositional area merits detailed regional studies in areas where lithologic data is more complete. It is of more than academic interest, for it is altogether possible that such investigations will aid in finding new oil and gas fields.

Some structural control of oil and gas accumulation is suggested by the occurrence of most of the Gordon and Fifth sand pools on a broad, structural terrace (fig 3, p. 7) northwest from the more steeply-dipping strata adjacent to the Nineveh syncline. It is possible that there has been updip migration from the structurally steeper synclinal flank to the flatter area where the oil and gas finally accumulated against the porosity wedge-out of the sands. On the other hand, it is equally possible that the structural terrace had no control over the location of the Gordon and Fifth sand pools. Since the terrace coincides roughly with the more porous, permeable portions of the sands, the accumulation of oil and gas here may be attributed solely to stratigraphic factors.

Stratigraphy

surface

The surface stratigraphy of the area discussed in this report has been described in considerable detail by Shaw and Munn (1911).

Briefly, the exposed consolidated beds in the producing area are, in descending order, as follows: The Washington group of the Permian system, and the Monongahela group and upper portion of the Conemaugh group of the Pennsylvanian system.

The Washington group, exposed on the highest hills and in the structurally lower areas, consists dominantly of shale, with interbeds of sandstone, limestone, and minor coals. Next below is the Monongahela group, which crops out over the greater part of the area, and is composed of shales, sandstones, limestones, and several important coal beds. The Pittsburgh coal, at the base of the group, is extensively mined by underground and strip methods. Below the Monongahela are the beds of the Conemaugh group, the oldest exposed strata in the area. These are dominantly shale, with sandstone, limestone, and non-commercial coal beds. This group will be discussed further below.

SUBSURFACE

General Statement

Knowledge of the subsurface stratigraphy in this area, particularly of the lower part of the Pennsylvanian system and of the Mississippian, is incomplete. Here, in common with many other oil and gas areas developed in the early days of the industry, well samples were rarely saved; driller's logs commonly fail to give data on the character of the oil and gas sands, and frequently lack information on the stratigraphic section from the surface down to the main-producing sands.

In connection with the current investigation, a detailed study (see Appendix, p. 98) was made of an almost complete set of samples from the S. B. Phillips No. 1 well, drilled in the northwestern part of the Moon Run-Crafton field, Robinson Township, Allegheny County. Individual specimens of the Upper Devonian producing sands of several wells were obtained during clean-out operations and from operators in the area. By judicious questioning of the operators, much information on the character of the sands was obtained. Lastly, considerable data has been drawn from the Carnegie quadrangle report by Munn (1911) who studied the oil and gas fields of the area in 1907 and had the opportunity to interview many of those active in the development of the fields.

In the following description of the subsurface stratigraphy of the Pennsylvanian, Mississippian, and Upper Devonian systems, surface and subsurface (or driller's) names are given for some stratigraphic units. This report has followed the generally accepted correlations as used at the present time. Confusion in nomenclature and correlation still exists regarding various sands, particularly those in the Pennsylvanian and Mississippian. The Berea is a case in point, although recent regional investigations appear to have clarified its position in the stratigraphic section. Rapid facies changes and thickening and thinning of Pennsylvanian and Mississippian sandstones has resulted in frequent misnaming of these beds by the driller.

In addition to the general stratigraphic description given below, further details concerning the stratigraphy of the producing sands will be found in the part of this bulletin treating of the oil and gas sands.

Pennsylvanian System

Conemaugh Group. The Conemaugh group includes the strata between the base of the Pittsburgh coal and the top of the Upper Freeport coal. The thickness of the group in the area averages 620 feet. It consists predominantly of shales, silty and sandy shales, with sandstones, and thin limestones, coals, and clays. Approximately 250 feet below the top of the group is a thin limestone member, the Ames, a widespread stratigraphic unit useful in surface geologic mapping. Unfortunately, it is rarely recorded in drillers' logs. There are four prominent sandstones in the Conemaugh group of the Carnegie quadrangle. In descending order these are as follows (driller's or subsurface name is given in parentheses): Morgantown (Murphy), Saltsburg, Buffalo (Little Dunkard), Mahoning (Big Dunkard). In some areas

of southwestern Pennsylvania the Little Dunkard is correlated with part of the Saltsburg. Drillers sometimes record the two lower sandstones, but rarely the upper two. None of these sandstones have been productive in this area although gas shows have been found in the Little and Big Dunkard.

Allegheny Group, Restricted. The Allegheny group is here restricted as proposed by Ashley (1945), to include the strata between the top of the Upper Freeport coal and the base of the Lower Kittanning coal. Thus restricted, the thickness of the group in the area averages 180 feet. The Allegheny group consists predominantly of shales and silty shales, with several coal beds, thin sandstones and some limestone. Of the coals, the Upper Freeport is economically the most important; it is usually recorded in the logs of recently-drilled wells. Other coals of the group are the Lower Freeport, and Upper, Middle, and Lower Kittanning.

Upper Pottsville-Kanawha Series. The Upper Pottsville-Kanawha series includes the strata between the base of the Lower Kittanning coal and the top of the Mississippian system. The series in this area has an average thickness of 300 feet. In the Carnegie quadrangle and adjacent areas there are several prominent sandstones in this series. In descending order, these are as follows (driller's or subsurface name is given in parentheses): Kittanning (First Gas), Clarion, Homewood (First Salt), Conoquenessing (Second Salt and Maxton). Considerable confusion exists in the driller's records in naming these various sands. The First Gas sand is frequently confused with the First Salt sand, and, in some instances, two or more of the sands are logged together and called "Salt sand." The Conoquenessing appears to be merged into a single sand body in some areas while in others it is separated by a shale, the upper unit being called the Second salt, the lower the Maxton sand. The First Gas and First Salt sands produce gas in a few wells.

Mississippian System

A regional unconformity marks the top of the Mississippian system. Few detailed subsurface data are available on the Upper Mississippian in this area, but the sample examination of the S. B. Phillips test in Robinson Township, Allegheny County, and correlations with the better known section of the North Strabane area (Fettke, 1946) suggest that all, or perhaps most of the Mauch Chunk has been removed by post-Mississippian erosion. Further, none of the Greenbrier group and its Loyalhanna limestone member were found in the samples of the Phillips well. In the southern part of the McDonald field and in the Venice field area, however, the Big Lime (driller's name for the Greenbrier or lower portion of it) is sometimes recorded. Based on this rather meager data, and also on regional considerations, it appears that the Upper Mississippian is progressively truncated from south to north in this area. A similar observation was noted by Munn (1911) for the Carnegie quadrangle.

Pocono Group. The Pocono group includes the strata between the base of the Greenbrier group, or top of the Big Injun sand (Burgoon

sandstone of the surface) and the base of the Murrysville sand. The group in this area has an average thickness of 660 feet, and consists of sandstones (somewhat more than half of the section), siltstones, and shales. In descending order the sandstones are the Big Injun, Squaw, Second Gas and Murrysville. The Big Injun produces gas in a few wells but only gas shows have been found in the Squaw and Second Gas sands. No shows have been reported in the Murrysville.

The Big Injun sand in this area has an average thickness of 200 to 250 feet. The latter thickness may include the overlying sandy Loyalhanna limestone which to the driller is scarcely distinguishable from the Big Injun. It cannot always be assumed, however, that the driller's Big Injun includes the Loyalhanna, as the latter may be absent in some areas (see S. B. Phillips No. 1, Appendix, p. 101) and present in full or in part in others.

The interval between the base of the Big Injun and the base of the Murrysville sands is one of considerable stratigraphic irregularities. The thickness of the sands in this section is very variable and facies changes occur over rather short distances. These conditions have led to confusion in the identification of the various sands by the drillers. Approximately 85 feet below the base of the Big Injun in this area is a sand usually called Squaw; it has an average thickness of 40 feet. In some instances, however, the name Squaw is applied to a sand below the Big Injun and separated from it by a few feet of shale. It is possible this latter sand represents a thickening of, and is essentially a sand unit with, the Big Injun.

Below the Squaw sand, and separated from it by approximately 15 feet of shale, a few records list a sand called "Bitter Rock," which has an average thickness of 24 feet. It appears to be in the approximate stratigraphic position of the Bitter Rock sand of the central and western part of the Burgettstown quadrangle.

In the lower 140 feet of the Pocono group is a sand-shale-siltstone sequence having the Second Gas sand at the top and the Murrysville sand at the base. The name Berea is sometimes erroneously applied to one or the other of these sands, but recent regional investigations by Demarest (1946) indicate that the Berea is correlative with a portion of the sandy shale and siltstone interval between the Second Gas and Murrysville sands. True Berea is, therefore, absent in this area.

The Second Gas sand is frequently called by the driller Gas sand and the Murrysville sand is often logged as Berea, Gas, Second Gas or Gantz sand. Both the Second Gas and Murrysville are commonly called Thirty Foot shells or Upper Thirty Foot shells. There is little reason to confuse the Murrysville with the Gantz sand, as a persistent and distinctive red, purple and/or green shale zone, sometimes called "red rock," occurs in the shale interval between the two sands.

Upper Devonian Series

The deepest test in this area is the E. H. Jennings Brothers, Mathews-Ewing No. 3, located in North Fayette Township, Allegheny County, which at total depth (3615 feet) was 1900 feet below the top of the Upper Devonian. Samples were not saved on this test.

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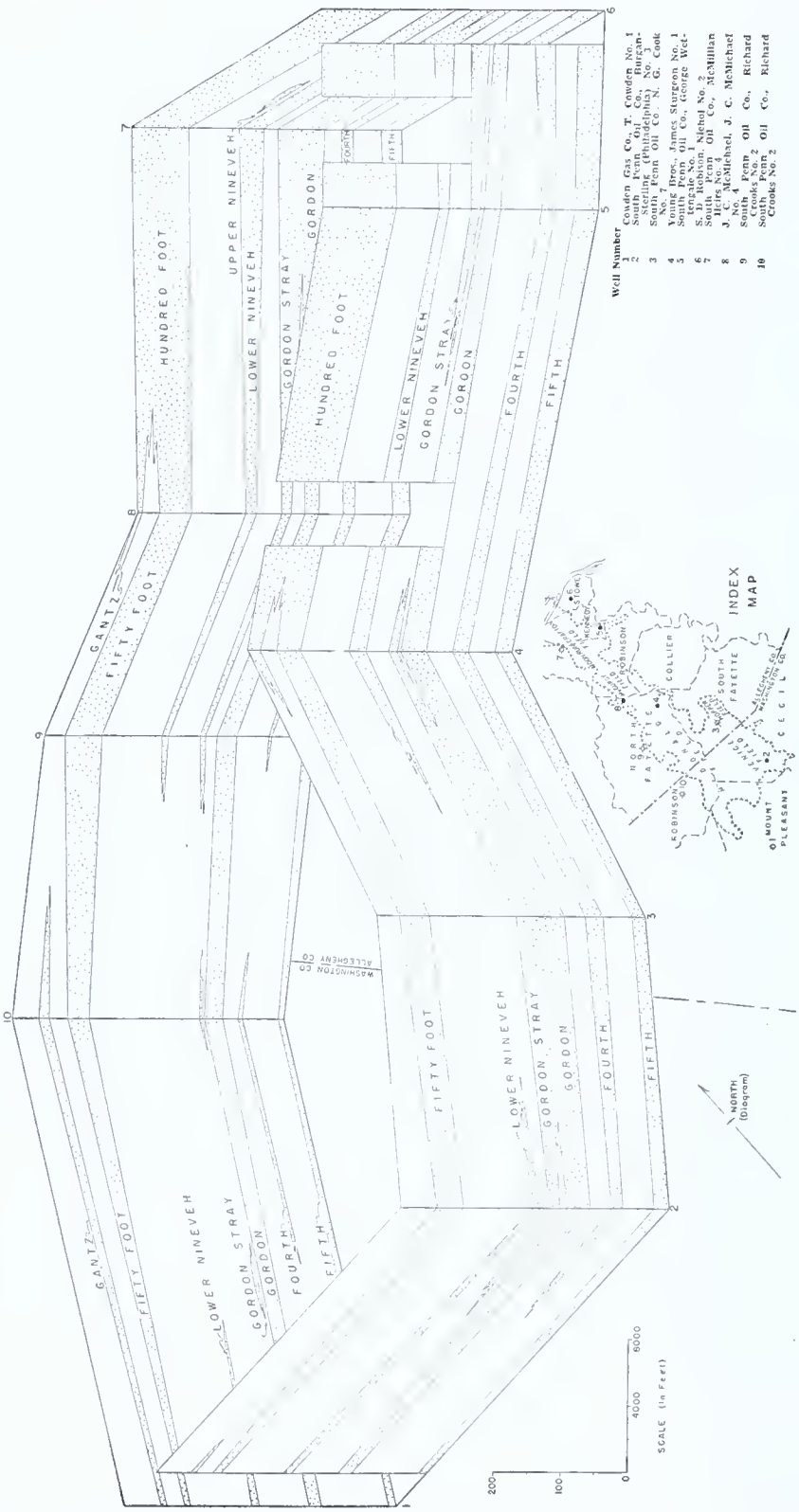

FIGURE 4. Fence diagram of McDonald and adjacent oil fields, showing Conewango group sands of the Upper Devonian.

Three deep wells, all dry, have been drilled nearby but outside the limits of this study. Peoples Natural Gas Company, R. A. Gearey No. 1, located 2½ miles north of Midway, drilled into the Niagara group of the Middle Silurian (total depth 7248 feet, elevation 1050 feet); Texas Company, A. Skraba No. 1, located 4 miles north of Midway, penetrated the Oriskany (total depth 6244 feet, elevation 1133 feet); the third test, Norwood P. Johnston, et al., A. T. McBurney No. 1, located 6 miles south of Midway, penetrated the Helderberg group (total depth 7050 feet, elevation 1278 feet). Samples of the McBurney test have been described by Fettke (1941). Although pre-Conewango group Upper Devonian samples are not available in the area embraced in this report, the description of this section in the McBurney test may indicate in a general way the stratigraphy of the deeper strata in the McDonald and adjacent fields.

Conewango Group. In accordance with the definition of the Conewango group as used by Fettke (1946), the strata between the base of the Murrysville sand and the base of the Fifth sand are assigned to this group. Thus defined, the Conewango group has an average thickness of 480 feet, and consists generally of highly quartzose, light-gray to white sands alternating with medium-gray shales. The group also contains beds of reddish to reddish-gray shales which represent the transition from the Catskill-type sediments of the east to the marine sediments of the west.

The Conewango group sands of this area are, in descending order, as follows: Gantz-Fifty Foot (which in places merge to form the Hundred Foot sand), Upper Nineveh, Lower Nineveh, Gordon Stray, Gordon, Fourth, and Fifth sands. The sands of the group are mineralogically similar, consisting dominantly of quartz cemented by silica and carbonates. Texturally they are quite variable, ranging from very fine sands to conglomerates containing cobbles up to 1¾ inches in diameter. The coarsest material, which usually contains the pay, is found in the Gordon, Fourth, and Fifth sands; extremely coarse and permeable sand is common in the Fifth sand which is also the most oil-productive of the Conewango group. The other sands of the group (above the Gordon) are irregularly coarse in various parts of the area.

A graphic three-dimensional representation of the Conewango group is shown in the fence diagram, (fig. 4, p. 16). In this diagram selected wells from the fields and outlying areas illustrate generally the lenticular character of the sands, particularly those from the Gordon Stray to the top of the section. Locally, the lenticularity of the sands is much more intricate than is shown in this diagram, but it is not practical to show these complexities in this illustration.

Table I (p. 18) presents data on the thickness of the producing sands of the Conewango group, the average depth of these sands below the Pittsburgh coal, and the thickness of the pay zones. It is particularly interesting to note that the Gordon and Fifth sands, which have produced so prolifically, each has an average pay thickness of only 7 feet.

Six cross sections, two being approximately parallel to the regional strike of the strata and four approximately parallel to the regional dip,

TABLE 1. *Upper Devonian oil and gas sands in the McDonald and adjacent oil fields Allegheny and Washington Counties, Pennsylvania.*

Sand	Average depth below Pittsburgh Coal	Sand Thickness: Range	Sand Thickness: Average	Pay Thickness: Range	Pay Thickness: Average
HUNDRED FOOT	1830	75-130	95	1-10	5*
GANTZ	1830	0-33	20	?	?
FIFTY FOOT	1880	11-70	45	1-10	5
LOWER NINEVEH	2020	0-40	20	1-13	5
GORDON STRAY	2063	0-30	20	1-9	5
GORDON	2090	8-50	25	1-17	7*
FOURTH	2157	0-45	18	1-15	5*
FIFTH	2215	5-50	22	1-15	7†

* May have two pays.

† May have several pays.

are shown (figs. 5, 6 and 7, pp. 19-21) (see pl. 2 for line of sections). The top of the Fifth sand was selected as the reference datum for these sections since this sand is recorded in many of the well records and no stray sand occurs between the Fourth and Fifth sands to confuse the driller. All sections show the lenticular nature of the sands, particularly those from the Gordon Stray to the Gantz. Further, the two strike sections, AA′ and BB′ (fig. 5, p. 19), the fence diagram (fig. 4, p. 16) and the Gordon, Fourth and Fifth sand isopach maps (pls. 7, 8

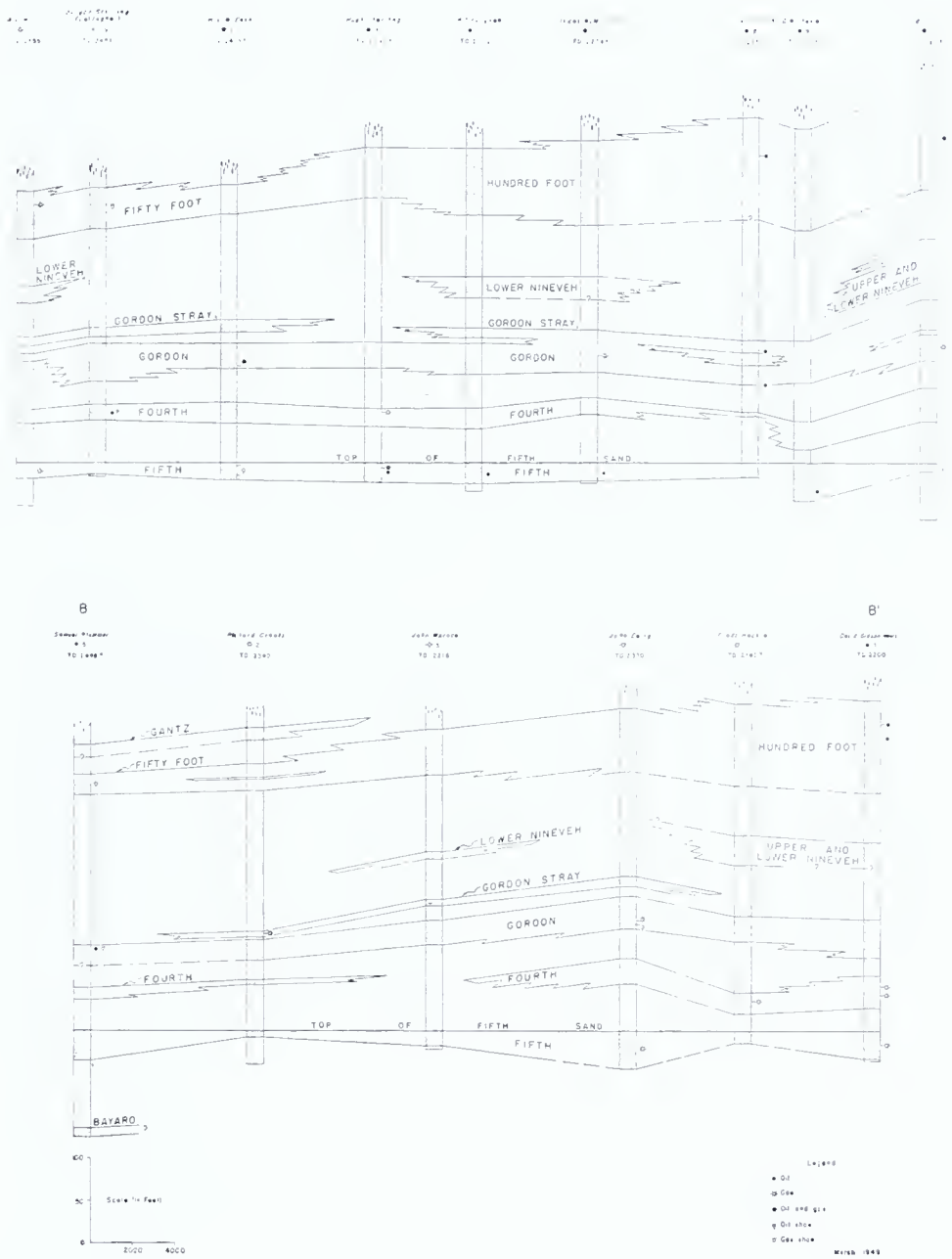

FIGURE 5. Cross sections AA′ and BB′, Venice, McDonald-McCurdy, Moon Run-Crafton oil fields. See Plate 2 for lines of section.

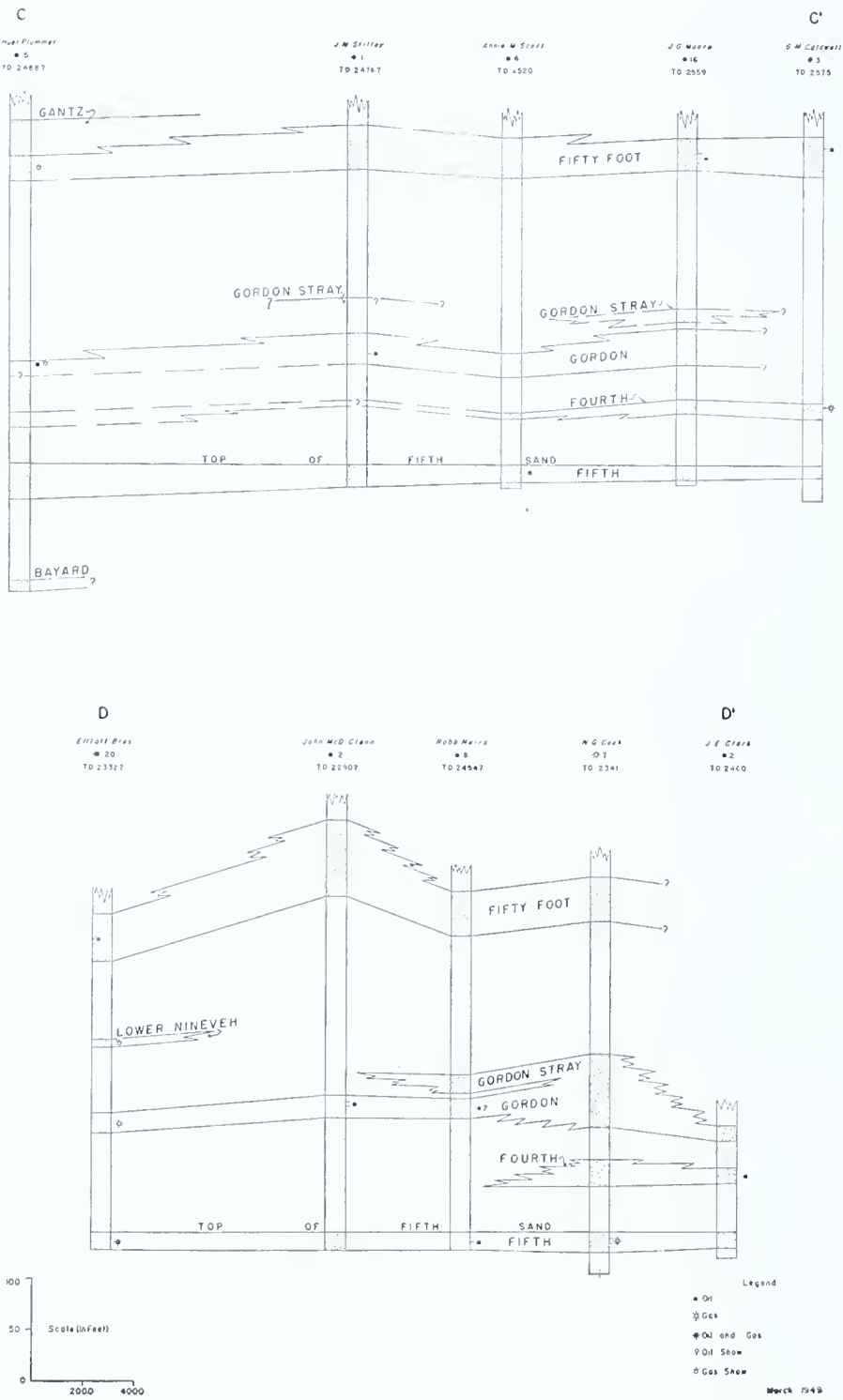

FIGURE 6. Cross section CC′ and DD′, Venice and McDonald oil fields. See Plate 2 for lines of section.

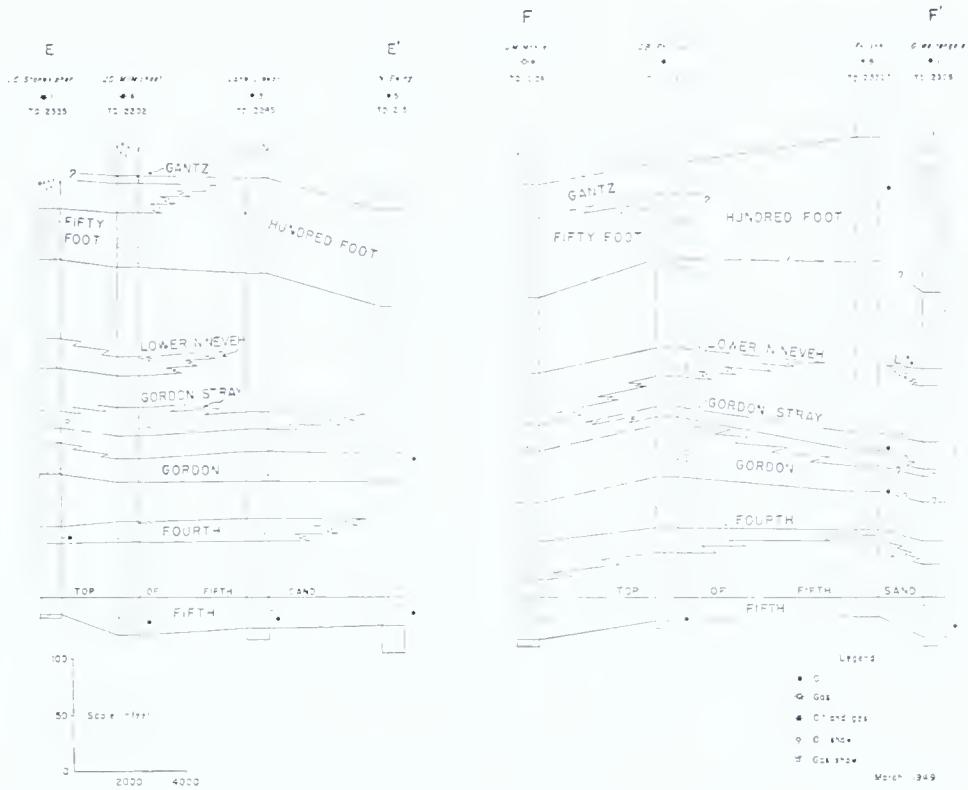

FIGURE 7. Cross sections EE′ and FF′, McDonald-McCurdy and Moon Run-Crafton oil fields. See Plate 2 for lines of section.

and 9) show the tendency of all Conewango group sands to thicken and/or to merge toward the northeastern part of the area. This northeastward thickening or merging of the various sands is suggestive of the approach to the outlet of an Upper Devonian stream or streams which furnished the Conewango group sediments in this area.

An interesting fact disclosed by the cross sections and the fence diagram is the relative persistency of the lower member as compared with the upper member of the three sand zones: (1) Gantz-Fifty Foot, (2) Upper Nineveh-Lower Nineveh, (3) Gordon Stray-Gordon. In each zone, the lower members—Fifty Foot, Lower Nineveh, and Gordon—are more persistent than are the upper members—Gantz, Upper Nineveh, and Gordon Stray.

OIL AND GAS SANDS

GENERAL STATEMENT

Most of the production in this area is obtained from three sands of the Conewango group—Gordon, Fourth, and Fifth. There are, however, a total of 10 productive sands ranging in age from the Upper Devonian to the Lower Pennsylvanian which are as follows:

Lower Pennsylvanian	First Gas	
	First Salt	
Mississippian	Big Injun	
Upper Devonian	Gantz	Hundred Foot*
	Fifty Foot*	
	Lower Nineveh	
	Gordon Stray	
	Gordon*	
	Fourth*	
	Fifth*	

* *Principal producing sands.*

The total number of wells which have produced from the Mississippian and Pennsylvanian sands is small. Plate 6 shows areas of production from sands of these systems. It is interesting to note that only gas is obtained from the Mississippian and Pennsylvanian sands, while oil and gas, but predominantly oil, are obtained from the Upper Devonian sands. This division of hydrocarbon character according to the age and depth of the reservoirs, although common in southwestern Pennsylvania, is the reverse of their occurrence in some other oil provinces where the lighter constituents are found in the deeper and older strata, while the heavier constituents are in the shallower and younger strata. There are, of course, many contributing factors, in addition to depth and age, which play a role in determining the character of hydrocarbons. The subject would be interesting as a regional study in the Appalachian area.

Plate 10, a composite columnar section of the McDonald and adjacent fields, shows the various oil and gas sands to be described below. The reader will find it helpful to refer to this columnar section in reading the following discussion.

FIRST GAS SAND

The First Gas sand, probably the correlative of the Kittanning sandstone and erratically distributed in the fields, has produced gas from one well in Cecil Township, Washington County (pl. 6). It is only occasionally logged by the driller in the southern part of the area. It may be absent in the northern part, particularly in Robinson, Stowe, and Kennedy Townships where it has not been recorded in the driller's logs. The sand varies in thickness from zero to 65 feet, averaging 32 feet, and occurs at an average depth of 836 feet below the Pittsburgh coal. It appears to have considerable vertical range in the section; this, combined with facies changes, has led to confusion in its identification. It is often erroneously called Salt sand although it lies above and is separated from the First Salt sand by 10 to 75 feet of shale. The First Gas sand contains some salt water.

FIRST SALT SAND

The First Salt sand, probably the subsurface equivalent of the Homewood sandstone, appears to occur over much of the area and has produced gas in a few wells in Cecil and Robinson Townships, Washington County, and North Fayette, South Fayette, Collier, and Robinson Townships, Allegheny County (pl. 6).

The First Salt sand is fine-grained to pebbly and contains numerous shale beds. It varies in thickness from 12 to approximately 90 feet, averaging 58 feet and occurs at an average depth of 905 feet, below the Pittsburgh coal. Where a thickness greatly in excess of 90 feet is logged, it is likely that some or all of the Second Salt sand is included.

Relatively rapid thickness and facies changes in the Upper Pottsville has resulted in much confusion in naming the sands of this series. The two sands—First Salt and Second Salt—are usually separated by shale or sandy shale although they are often grouped together and logged as "Salt sand." In some instances the Salt sands are miscalled Gas or First Gas sand, or the First Gas and Salt sands may be logged as a unit. In most areas, however, approximately 50 feet of shale or sandy shale occurs between the First Gas and First Salt. The First Salt and underlying Second Salt (Upper Conoquenessing) sands may be absent in northern Stowe and Kennedy Townships as they are not logged in these areas.

Gas is found at an average depth of 20 feet below the top of the sand. Both Salt sands frequently contain abundant quantities of salt water.

BIG INJUN SAND

The Big Injun sand is thick and persistent in southwestern Pennsylvania. It produces gas in various areas throughout the fields, (pl. 6) except in Robinson, Stowe and Kennedy Townships, Allegheny County.

The Big Injun is a fine- to medium-grained, light gray to white sandstone; irregular shale beds in the sand are recorded in some areas. It has been logged from less than 200 feet to over 400 feet in thickness, averaging 200 to 250 feet. Where thicknesses in excess of 250 feet are recorded, the driller has probably included some of the underlying Mississippian sands and the overlying sandy Loyalhanna limestone, the latter often being logged as the upper portion of the Big Injun (p. 15). The top of the Big Injun occurs at an average depth of 1120 feet below the Pittsburgh coal. Gas, although occasionally found within a few feet of the top, more commonly occurs from 60 to 100 feet within the sand and in rare cases, two gas pays are found. Salt water is occasionally encountered in the Big Injun.

GANTZ—FIFTY FOOT (HUNDRED FOOT) SANDS

The Hundred Foot sand, possibly correlative with the First sand of northern Pennsylvania, is locally separated by a shale, 2 to 33 feet thick. Where so divided, the upper member is known as the Gantz, the lower as the Fifty Foot. The sand names—Hundred Foot and Fifty Foot are derived from the approximate thickness as developed in their

"type" locality, probably Butler County. In the area included in this study they vary considerably in thickness.

The sands of this zone are lithologically similar, being light gray, dominantly quartzose, very fine-grained to irregularly conglomeratic and contain occasional interbedded shales. The Gantz sand and its correlative, the upper portion of the Hundred Foot sand, occurs at an average depth of 1830 feet below the Pittsburgh coal; the Fifty Foot sand averages 1880 feet below the coal. The thickness of the sands of this zone is as follows: Gantz, zero to 33 feet, averaging 20 feet; Fifty Foot, 11 to 70 feet, averaging 45 feet; Hundred Foot, 75 to 130 feet, averaging 95 feet.

Of the two sand members—Gantz and Fifty Foot—the latter is much more persistent. The Fifty Foot sand occurs throughout the entire area either as a separate sand or as the lower part of the Hundred Foot sand; the Gantz has been recorded as a separate and distinct, well-developed sand in only a few isolated areas within the fields. More regional investigations, however, made in connection with this report, have revealed the presence of the Gantz in much of Cecil and South Fayette Townships, southeast of a belt roughly delimited by Millers Run Valley, and in the central portion of Collier Township. Northwest of these two areas, within the fields embraced in this investigation, the Gantz is seldom recorded and presumably is usually absent as a separate sand. It has been logged in a few areas adjacent to the common boundaries of North Fayette and Robinson Townships, Allegheny County and in several wells in Robinson and Mount Pleasant Townships, Washington County.

The Hundred Foot occurs in an irregular area of North Fayette Township, northeast of Noblestown, and in Collier, Robinson, Stowe and Kennedy Townships. The relationship of this sand and its two members is shown in the fence diagram (fig. 4), and in the cross sections, (figs. 5, 6 and 7, pp. 19-21). These illustrate the southwest and northwest thinning of the Hundred Foot sand, chiefly by a facies change of its uppermost portion (Gantz sand equivalent) from sand to shale. The Gantz reappears, as noted above, in various updip areas of the fields, but generally is absent. The lowermost member of the Hundred Foot, the Fifty Foot, also thins to the southwest and northwest, but does not disappear as a sand.

The names of the sands, as used by the driller, are frequently in error. If both members are present—Gantz and Fifty Foot—and separated by a shale, they are usually identified correctly. If only the Fifty Foot is present as a sand, however, it is often erroneously called Hundred Foot.

Based on total productive acreage (pl. 6), the Hundred Foot-Fifty Foot sand zone ranks fourth in importance in this area. Most of the Hundred Foot production, which is chiefly oil, is obtained from the northern and northwestern portion of the Moon Run-Crafton field and northwest of the main portion of the McCurdy field. The Fifty Foot sand is an important producer of oil and gas in the southern portion of the Venice field. The Gantz, where recognized as a distinct sand, has furnished gas but no oil in only two wells in the entire area, these

being in the southeastern part of the Venice field. In addition to the areas defined above, small isolated occurrences of oil and gas in the Hundred Foot-Fifty Foot sand zone are found throughout the fields.

Oil and gas production is encountered on an average of 45 feet from the top of the Hundred Foot sand and 11 feet from the top of the Fifty Foot sand; the pay thickness varies from 1 to 10 feet, averaging 5 feet, and in some areas there are two productive zones in the Hundred Foot. Unlike other sands of the Conewango group, the Hundred Foot-Fifty Foot frequently contain considerable salt water, especially in the northeastern portion of the area. Field men report that the best production from these sands is obtained from wells which produce considerable water with the oil.

LOWER NINEVEH SAND

Regional studies of the oil-bearing sands of southwestern Pennsylvania by Matteson and Busch (1944) has shown that the Nineveh, in many areas, consists of two sands, which they called the Upper and Lower Nineveh. Previous to their study, the name Nineveh was rarely used in this area, the sand or sands (Upper or Lower Nineveh or both where merged) being called "Thirty Foot." The work of Matteson and Busch disclosed the correlation of the Nineveh of the type area, the town of Nineveh, Greene County, Pennsylvania, with the Thirty Foot sand. Further regional studies will have to be made in order to determine the correlation of the Nineveh sands with the Thirty Foot sand as used in other portions of Allegheny County, Butler County and areas to the north. As mentioned previously, a similar name, Upper Thirty Foot or "Thirty Foot shells" is applied to one or more sands in the lower Mississippian. This is not to be confused with the Devonian Thirty Foot (Upper and/or Lower Nineveh).

Both the Upper and Lower Nineveh sands are frequently not recorded and supposedly are absent in a large part of the fields. The Lower Nineveh, however, appears to have a more widespread areal distribution than does the Upper Nineveh. In parts of the northern portion of Kennedy and Robinson Townships, Allegheny County, both sands merge into a single sand approximately 50 feet thick.

The lithology of the Lower Nineveh is not well known as few samples of it are available. In the S. B. Phillips No. 1 test, the sand is quartzose, very fine- to coarse-grained and pebbly, with common interbedded shales. It occurs at an average depth of 2020 feet below the Pittsburgh coal and varies in thickness from zero to 40 feet, averaging 20 feet.

The pay zone in the Lower Nineveh is encountered at an average depth of 6 feet from the top of the sand and varies in thickness from 1 to 13 feet, averaging 5 feet. The sand contains little salt water. From the standpoint of total productive acreage, the Lower Nineveh is the least important of the producing sands of the Conewango group. It has furnished gas in several small areas in the McDonald field and oil and gas in the McCurdy and Moon Run-Crafton fields (pl. 6). No production has been obtained from the Upper Nineveh.

GORDON STRAY SAND

The Gordon Stray is an erratic, highly lenticular sand occuring above, and generally separated from, the Gordon sand by 1 to 35 feet of shale. Locally it merges with the Gordon to form a single sand body.

The Gordon Stray sand is light to dark gray, quartzose, fine- to medium-grained, and often contains shale or sandy shale beds. It occurs at an average depth of 2063 feet below the Pittsburgh coal and varies in thickness from zero to 30 feet, averaging 20 feet. Oil or gas production is encountered on an average of 7 feet from the top of the sand and the pay thickness varies from 1 to 9 feet, averaging 5 feet. There is little salt water in the sand.

The total area producing oil and gas from the Gordon Stray is rather small (pl. 3). Its correlative equivalent, however, represented by the upper portion of the merged Gordon Stray and Gordon sands in the Moon Run-Crafton field, has furnished considerable production.

Many of the well records do not record the Gordon Stray sand and apparently it is absent over a greater part of the area. Where the sand is separated from the Gordon, it is usually correctly identified by the driller; if the two sands are merged, however, the driller calls the entire sand Gordon. In some instances the sand is misnamed Thirty Foot.

GORDON SAND

Based on productive capacity and acreage, the Gordon sand ranks second in importance to the Fifth sand. It has furnished a large part of the oil in the McDonald and the Moon Run-Crafton fields (pl. 3). There is a large area (chiefly in the "McCurdy" field), approximately 4 miles in length between the northeastern end of the McDonald field (near North Fayette, Robinson Township boundary) and the southwestern part of the Moon Run-Crafton field where Gordon production occurs in small, isolated patches. The sand in this area is generally tight and fine grained; production is obtained only in those places of local coarsening of the sand.

The Gordon sand is light gray to white, highly quartzose, fine-grained to conglomeratic and occasionally contains interbedded shale. The coarsest material in the Gordon consists of quartz cobbles up to an inch in the longest dimension; the cobbles are flattened and ellipsoidal or irregularly ovoid. Roundness varies with the particle size, the larger cobbles being more rounded than the small ones. The coarse material is usually frosted and rarely the surfaces are pitted. Sorting in the coarser zones is very poor.

The Gordon occurs at an average depth of 2090 feet below the Pittsburgh coal and varies in thickness from 8(?) to 50 feet, averaging 25 feet (pl. 7). The maximum thickness, 50 feet, is exceptional. In general, if more than 40 to 45 feet is logged, the driller has probably included the overlying Gordon Stray. In some areas this sand is merged with the Gordon (see below) while in others the two sands are separated by a shale 1 to 35 feet thick. The upper 4 to 5 feet of the Gordon is generally tight and well indurated. Just below is the coarse pay portion of the sand, the pay thickness varying from 1 to

17 feet, averaging 7 feet. Two pays are sometimes found, usually near the top and middle of the sand, although occasionally oil is encountered near the base. The pays are separated by shaly sand or sandy shale. The Gordon is mainly an oil producer, but gas is found along the thin marginal edges and in the structurally higher portions of the sand. Connate water is common in the Gordon of the southern and southeastern portions of the Venice field and in a small area northeast of Reissing in South Fayette Township.

Toward the northeast, in northern Robinson, Collier, Kennedy and Stowe Townships, the Gordon Stray and Gordon are locally merged into a single sand body having a thickness of 55 to 70 feet. Offsets to a well in which a single sand was logged, may show two distinctly separated sand units, indicating the erratic merging of the Gordon and Gordon Stray. This may be due in part to errors in logging as it is possible that the driller has failed to recognize the shale separating the two sands. Regional relationships, however, indicate the tendency of the two sands to merge toward the northeast.

A structural map, contoured on the top of the Gordon sand, is shown in Plate 3. Additional details concerning this map are given on pages 10 and 37.

The Gordon sand is being successfully repressured by gas injection in the southern part of the McDonald field. This project, the only secondary recovery program by repressuring in the entire area, is described in detail by E. M. Tignor and W. M. Nabors in Part II of this bulletin. Secondary recovery of oil by vacuum applied to the Gordon sand has been found unsuccessful in this area as it tends to reduce rather than increase production.

FOURTH SAND

This sand is the main source of oil in the Venice and Hopper fields and has also furnished considerable production in the Moon Run-Crafton field. In the area between these fields, the Fourth is a relatively unimportant source of oil, production being confined to small isolated areas in the McDonald and McCurdy fields (pl. 4). Although primarily an oil producer, the Fourth sand contains gas along or near its borders and in the structurally high areas.

Lithologically, the Fourth sand is similar to the Gordon and Fifth, but in general, does not contain the very coarse material found in these two sands. It is gray to grayish brown, fine- to coarse-grained, occasionally conglomeratic, and irregularly shaly. The pay portion is usually found in the medium to coarse grained "sugary" (average 2-3 mm.) or pebbly-textured sand. Pebbles or cobbles are of various shapes, but as in the Gordon, they are usually well rounded and frosted, flattened ellipsoids or irregularly oval-shaped. An unusual Fourth sand sample from the Venice field contained a cobble measuring approximately 1½ inches in its longest dimension. Such larger fragments often occur as isolated pebbles or cobbles in a medium grained matrix.

The top of the Fourth sand occurs at an average of 40 feet below the base of the Gordon and 2157 feet below the Pittsburgh coal. It

varies from zero to 45 feet in thickness, averaging 18 feet (pl. 8). An erratic thickening of the Fourth sand to 50 to 78 feet occurs in some of the wells just east of Moon Run (Hartley and Wettengale farms) and 2½ miles northeast of Moon Run (M. Clever, Ewing, Joyce and Speer farms). This thickening occurs at the bottom of the Fourth sand by a change in facies from shale to sand in the interval between the Fourth and Fifth sands.

Pay thickness in the Fourth varies from 1 to 15 feet, averaging 5 feet; in some instances two pays occur. Production is usually found approximately 6 feet below the top of the sand, just under an indurated and tight sand "cap". In some wells in Stowe and Robinson Townships, Allegheny County, however, the pay is encountered 28 to 42 feet below the top of the Fourth sand, within 4 to 11 feet of its base. The Fourth sand generally contains little salt water, but some has been found in the Hopper field.

Structural contours are drawn on the top of the Fourth sand in the Venice-Hopper fields (pl. 4). Further details concerning this map are given on pages 10, 11, and 37.

The South Penn Oil Company has conducted experimental repressuring of the Fourth sand in the Venice field. These experiments were unsuccessful, probably due to mechanical difficulties rather than the nature of the sand.

FIFTH SAND

The Fifth sand, sometimes called the McDonald sand, ranks first in importance in this area. It produces in a continuous belt extending from 3 miles south of Midway to 1½ miles north of Moon Run, a distance of approximately 14 miles (pl. 5). Isolated productive areas occur 2 miles farther northward to Neville Island. The very prolific production obtained in the McDonald and McCurdy fields was obtained from this sand.

The Fifth sand is similar to the Gordon, being light gray to white, highly quartzose, fine-grained to conglomeratic, with occasional shale intercalations. Extremely coarse material is found in the Fifth sand and cobbles in excess of an inch (up to 1¾ inches) in the longest dimension are not uncommon in the McDonald field. These cobbles are frequently frosted and flattened, ellipsoidal, or ovoid, and well rounded, becoming more irregularly shaped and subrounded with decreasing size. Sorting in the coarser zones is very poor.

A structural map contoured on the top of the Fifth sand is shown in Plate 5. Additional details concerning this map are given on pages 11 and 37.

Sands correlated with the Fifth are productive (chiefly gas) in various places east of the fields described in this report. The Fifth sand trend in the McDonald and adjacent fields, however, may mark the regional west limits of the sand. Published studies show a few small "islands" of Fifth sand to the west of these fields, but the regional limits appear to be essentially defined along the updip portion of the McDonald-McCurdy and Moon Run-Crafton fields. The question might well be raised as to the possibility of a genetic relationship between the

high productivity of the Fifth sand here and its location as the westernmost (farthest seaward in Upper Devonian time) of the various Fifth sand bodies. The writer does not imply that the Fifth sand, wherever developed, is of the same age—on the contrary, as explained in the discussion of the sand origin later, this sand and others were deposited in transgressive and/or regressive seas. The writer does suggest, however, that there may be some relation between geological factors conducive to oil and gas formation and accumulation, and the final sand development (most seaward) in a regressive phase or initial sand development (most seaward) in a transgressive phase.

The top of the Fifth sand occurs at an average of 40 feet below the base of the Fourth sand and 2215 feet below the Pittsburgh coal. It varies in thickness from 5 to 50 feet, averaging 22 feet (pl. 9). Like the Fourth, the Fifth sand thickens toward the northeast, reaching its maximum development in Kennedy and northern Robinson Townships, Allegheny County. The pay is found in the coarse zones within the sand and varies in thickness from 1 to 15 feet, averaging 7 feet. Production is usually found approximately 5 feet from the top of the sand, below a tight sand "cap"; in Kennedy Township, however, there is a pay zone near the bottom of the sand. Multiple pays may be encountered in the various coarse lenses within the sand body. Vertical permeability between the coarser zones appears to be low as indicated by very large and abrupt increases in production on successive deepening of wells through the Fifth sand. Rapid lateral changes in the character of the Fifth sand are common in certain parts of the field, especially in the vicinity of the town of McDonald, where very small wells or dry holes in the Fifth have been obtained as offsets to prolific wells in the same sand.

The Fifth sand, like the Gordon and the Fourth, is primarily an oil producer. As with the other two sands, however, gas is also produced in the structurally higher portions, and outer fringes of the sand body. Isolated gas production is obtained in small areas outside the general productive limits, but well data is often too fragmentary and sparse to determine if these areas represent spurs from the main sand body or merely local sand development.

The Fifth sand appears to contain little salt water except in local areas of northwest Collier and southwest Robinson Townships, Allegheny County.

Secondary recovery of oil by vacuum applied to the Fifth sand has been employed in various parts of the fields since 1920. Unlike the Gordon, this technique has proven very successful in the Fifth sand. Gas is being injected into the Fifth sand in a few wells in the McDonald field (see Part II, pp. 43 and 46).

DESCRIPTION OF THE FIELDS

The following description of the producing areas is in part a recapitulation of the foregoing data; here included however, are additional comments on various aspects of the fields. The field limits are defined, but as previously mentioned, field limits in some areas are largely

arbitrary. Geological boundaries between some segments of the fields are vague as the producing sands of one field may overlap those of another. For the historical background of the fields, the reader is referred to the history chapter of this bulletin.

McDonald-McCurdy Fields

These two fields are treated as a unit since, from the standpoint of stratigraphy, structure, and producing sands, they are closely related. The fields, named after the town of McDonald and the McCurdy farm, are defined here by the producing limits of the Gordon and/or Fifth sands extending from approximately 3 miles south of Midway, northeastward to an area one mile northeast of Gayly, where there is an abrupt constriction and narrowing of the Fifth sand productive belt (fig. 2, p. 2 and pls. 3, 5). Thus defined, the McDonald-McCurdy fields are 11½ miles long and from 1 to 3 miles wide. The greater part of this area—approximately 10 miles northeast-southwest, to the North Fayette-Robinson Township boundary—is often considered as the McDonald field; this township boundary, however, is purely a geographic, not a geologic limit. The McDonald-McCurdy fields include approximately 16,730 acres; about 1640 wells have been drilled here of which 292 are still producing.

The structure of the McDonald-McCurdy fields is shown in Plates 2, 3, and 5, contoured on the base of the Pittsburgh coal, top of the Gordon sand, and top of the Fifth sand, respectively. Regionally, the fields are located on the northwest flank, and only a few miles west of the axis of the Pittsburgh-Huntington synclinorium. The regional dip in the fields is generally southeast toward the Nineveh syncline although in the southern and southwestern portion, the dip is dominantly south into the Cross Creek syncline. Broadly the structure is a modified homocline, interrupted by the Wildwood anticline and the Mt. Nebo syncline which plunge south and southwest with decreasing intensity toward the Cross Creek syncline. As Munn (1911, p. 91) pointed out, much of the McDonald field is located on a broad and irregular structural terrace, (fig. 3, p. 7) just northwest of steeper dips which occur immediately adjacent to the axis of the Nineveh syncline.

Isopachs of the Gordon and Fifth sands are shown in Plates 7 and 9. Although the sand thicknesses vary appreciably within short distances, the variation for most of the area is relatively small. The thick and thin areas are distributed in a random manner although the sand body as a whole trends northeast-southwest. There is no correlation between sand thickness and oil or gas productivity. Further data on lithologic characteristics and sand and pay thicknesses of the Gordon, Fifth and other sands is given in the section describing the oil and gas sands (pp. 21-29).

Areas of production from the various sands in the McDonald-McCurdy fields are shown in Plates 3, 5, and 6. The main producing sands of the area are the Fifth and Gordon. They are found at depths ranging from 2100 to 2500 feet and have provided most of the oil and gas production, although the Gordon is productive only in small iso-

lated areas in the northeast (McCurdy) end of the two fields. The Fifth sand contains very little salt water, but a considerable amount is found in the Gordon in the southwestern and southern end of the McDonald field. Five other sands also produce oil and gas, namely the Hundred Foot and its lower member, the Fifty Foot, Lower Nineveh, Gordon Stray, and Fourth. Three shallow sands produce gas—the First Gas, First Salt, and Big Injun. These eight sands, however, are productive only locally and are relatively unimportant as sources of oil and gas.

The initial production of wells in the McDonald-McCurdy fields ranged from 1 to approximately 16,000 barrels of oil per day, the latter production being obtained from Mevey No. 1 (now No. 17) located three-quarters of a mile north of the town of McDonald; Mathews No. 1, one mile north of Noblestown, had an initial production in excess of 14,000 barrels per day. The present monthly production of the wells ranges from 3 to 520 barrels, averaging 28 barrels per well. The most productive area in the McDonald-McCurdy fields is located in a belt extending north forty degrees east from the town of McDonald. This trend includes, among others, the following farms: Mary Robb, Miller Heirs, James Mevey, Elliott Brothers, Samuel Sturgeon, James Wallace, Morgan Heirs, J. J. Mathews, Mathews Heirs, G. W. Baldwin, Abram Bell, and Thomas Gamble. Numerous wells on these farms had an initial production in excess of 1000 barrels a day.

Many of the Fifth sand wells are produced by vacuum. The Gordon sand is being repressured by gas in seven wells in the southern part of the McDonald field; this project is described by E. M. Tignor and Wm. M. Nabors in Part II of this bulletin. A number of leases in the southwestern part of the McDonald field have shown production increases caused by accidental water flooding (due to improperly cased or plugged wells) of the Gordon and Fifth sands as described on page 38.

VENICE-HOPPER FIELDS

The Venice-Hopper fields constitute a single area defined by the producing limits of the Fourth sand and extending from 1 mile west of Venice to 1 mile southwest of Hickman. Thus defined, the Venice-Hopper fields are 6 miles long and from ½ to 2 miles wide. The eastern limit of the Hopper field is vague and it may be connected by a narrow productive belt with the Lickskillet field; several dry holes, however, indicate a separation of the two fields. The Venice-Hopper fields embrace approximately 3670 acres. Approximately 425 wells have been drilled here of which 72 are still producing.

Structurally, the Venice-Hopper area is located downdip from the McDonald-McCurdy fields and 2½ to 6 miles west of the axis of the Pittsburgh-Huntington synclinorium. The regional dip in the area is south and southeast into the Nineveh and Cross Creek synclines. The southern termination of the Wildwood anticline is located in the Venice field; approximately transverse to it is the Cross Creek syncline. Local structural details of the Venice field are shown in Plates 4 and 2, contoured on the top of the Fourth sand and base of the Pittsburgh coal, respectively.

An isopach map of the Fourth sand in the Venice field is shown in Plate 8. Insufficient data were available in the Hopper area to permit drawing thickness contours. The Fourth sand, like the Gordon and Fifty Foot sands of the McDonald-McCurdy fields, shows no relation between productivity and sand thickness. Additional data on the thickness and characteristics of the Fourth and other producing sands of the Venice-Hopper fields are given in the chapter on oil and gas sands (pp. 21-29).

Areas of production from the various sands are shown in Plates 3, 4, 5, and 6. The principal producing sand is the Fourth which is found at depths of 2300 to 2400 feet. Although mainly an oil sand, it has produced considerable gas in the southern and structurally highest portion of the Venice field south of the Cross Creek syncline. Next in importance to the Fourth is the Fifty Foot sand from which considerable gas and oil have been obtained in the Venice field. The Gordon sand pool of the McDonald field extends southward a short distance into the Fourth sand productive area, but the very prolific Fifth sand of the McDonald-McCurdy fields, is poorly developed and is productive only in a few isolated wells. Minor oil production has been obtained from the Gordon Stray, and gas from the First Salt and Big Injun sands.

The initial production of wells in the Venice-Hopper fields ranged from a few barrels to approximately 2400 barrels of oil per day, the latter figure, however, being very exceptional. The present monthly production varies from 6 to 108 barrels, the average approximately 33 barrels per month. The most productive area was on the Burgan-Sterling farm, located in the southwestern, structurally lowest part of the Fourth sand pool. Gravity drainage of oil into this low may account for the superior productivity of this area. The Fourth or Fifth sands contain little salt water, but water is frequently found in the Gordon and Fifty Foot.

Experimental repressuring was attempted by the South Penn Oil Company in the Fourth sand near Venice. Although this project was not successful, its failure may have been due to mechanical difficulties rather than the nature of the sand.

MOON RUN-CRAFTON FIELD

The Moon Run-Crafton field, named after the towns of Moon Run and Crafton, consists of a group of pools located in Robinson, Kennedy, Stowe and Collier Townships, Allegheny County. The north and south limits of this area are largely arbitrary, being defined by the Gordon and Fifth sand pools, beginning approximately 1 mile northeast of Gayly (common boundary with the McCurdy field), and extending to Neville Island in the Ohio River (pls. 3 and 5). Both the southeast and northwest limits are indistinct as there appears to be some overlapping and/or connection of the productive sands with those of the Chartiers field, east of Chartiers Creek, and the Ewings Mill field of northern Robinson Township. As defined by the Gordon and Fifth sand pools, the Moon Run-Crafton field is 4½ miles long, 2 miles wide

and includes approximately 2265 acres. About 350 wells have been drilled here of which 89 are now producing.

Like the other fields included in this study, the Moon Run-Crafton field is located near the Pittsburgh-Huntington synclinorium, lying approximately 5 miles west of the axis of this major structure. The regional dip, interrupted by several local flexures, is dominantly south, the structural contours having a general east-west strike in contrast with the prevailing northeast trend of the McDonald field (Munn 1911). Structure maps of the area are drawn on the base of the Pittsburgh coal (pl. 2) and top of the Fifth sand (pl. 5). Contours on the coal have not been drawn in the extreme northeastern part of Kennedy, Stowe and Robinson Townships where the coal has been removed by erosion. It was considered inadvisable to contour the top of the Gordon sand in this field as it frequently merges with the Gordon Stray and the character of the well data is often too poor to determine accurately the top of the Gordon sand. An isopach map of the Fifth sand in a portion of the Moon Run-Crafton field is shown in Plate 9. Additional data on the thickness and characteristics of the producing sands of the Moon Run-Crafton fields are given in the oil and gas sands chapter of this bulletin (pp. 21-29).

Areas of production from the various sands in the field are shown in Plates 3, 4, 5, and 6. The Gordon and Fifth sands, located at depths of 1650 to 2280 feet, provide most of the oil and gas production. The oil pools in these sands are located largely in the southern half of the field although both are productive of gas in various isolated areas in the northern and structurally highest part of the area. Five other sands, arranged in order of importance are productive: Hundred Foot, Fourth, Gordon Stray, Lower Nineveh, and First Salt. The first four of these produce oil and gas, largely oil, but only gas is obtained from the First Salt sand.

The initial production of the wells in the field ranged from 1 to 500 barrels of oil per day. The present monthly production varies from 5 to 66 barrels, averaging about 23 barrels per month. A small amount of water is sometimes found in the Gordon sand, and considerable in the Hundred Foot, but very little in the Fourth or Fifth sands.

ORIGIN OF THE SANDS

The following discussion concerning the origin of the producing sands will be confined to the principal sands—Gordon, Fourth, and Fifth—about which most is known.

In determining the origin of the sand bodies, much requisite data is not available. Information concerning the physical and mineralogic character of the sands, stratigraphic relation of the sands with the surrounding strata, presence of fossils, and occurrence of shale beds within the producing sands, was rarely recorded in the early days of the oil industry, and the fields were developed before the advent of coring and electric logging.

Despite the lack of detailed information in the area studied, some facts concerning the sands are known which are indicative of (1) the

environment of deposition, and (2) the type of sedimentary feature. In considering the following data concerning the Gordon, Fourth, and Fifth sands, no single characteristic can be used as a criterion indicating their origin. All taken together, however, are suggestive of the genesis of the sands:

(1) Marine fossils have been found in the sediments of the Conewango group.

(2) Regional knowledge of the stratigraphy of the Upper Devonian sediments in the Appalachian Basin indicates continental deposition to the east and marine deposition to the west.

(3) The rather abrupt westward (seaward) termination of the sands is suggestive of features found off present coasts.

(4) The coarser portions of the Gordon and Fifth sands occur near the west edge of the sands. This suggests the concentration of larger particles on the seaward side of the sand bodies by the vigorous action of waves and currents.

(5) The presence of shale or sandy shale areas northeast and southwest of the sand bodies suggests inlets between bars such as are found off present coasts.

(6) The purity of the sands, which consist dominantly of quartz, and their relative thinness compared with their areal extent, are suggestive of a depositional environment capable of excellent sorting and distributive powers.

The above characteristics, combined, suggest that the Gordon, Fourth, and Fifth sands were deposited in a shallow marine environment. Further, their areal distribution, relatively thin dimensions, and their lens to disc-shaped cross sections are strongly indicative of certain kinds of marine deposits, namely offshore bars, spits, and associated features.

An examination of the literature reveals that one criterion used to support the bar origin of various sand bodies is a particular cross-sectional shape—a convex top and a flat base. Shape studies in this area have been inconclusive. The typical shape of a bar may, however, be considerably modified. The shape of its base will depend on the configuration of the surface on which it is deposited. The shape of its top and the areal outline of the body may be greatly altered by wave and current action subsequent to deposition. Differential compaction and structural deformation may further change its shape.

This study was not extended to the east to determine if lagoonal-type sediments are present shoreward from the sands. Such sediments may or may not develop extensively between an offshore bar and the mainland. If the bar is of a submarine type and there are sufficient inlets permitting free circulation between the open sea and the mainland, extensive lagoonal deposits may not form.

The isopach maps of the Gordon, Fourth, and Fifth sands of southwestern Pennsylvania by Matteson and Busch (1944) show that these sands occur from southeast to northwest in alternating thick and thin

(or no sand) areas, the strike of the sands being generally northeast-southwest. This feature, together with the lateral sand and shale interfingering relationship, and the alternating sand and shale vertical sequence, suggests an oscillating shoreline. Regional stratigraphic data of the Upper Devonian in Pennsylvania indicate that the overall movement of the shoreline was seaward retreat to the west and northwest, but there were undoubtedly periodic transgressions and regressions of the sea during this general regressive period. Between these advances and retreats of the sea there were probably periods of relative stability. It is possible the thicker areas of the sands correspond to these periods of stability during which time there was sufficient wave and current action, operating in various areas, to sort and winnow out the finer material and concentrate the coarser. Conversely, the areas of thin or shaly sand, or no sand, correspond to the relatively rapid advance or retreat of the sea when there was insufficient time to concentrate and develop thicker sands.

As to the cause of repeated Upper Devonian transgressions and regressions of the sea, a theory proposed by Williams (1932) to explain the alternating marine-non-marine Upper Cretaceous sequence in the southern plains of Canada, appears most applicable here. Believing that the theory of diastrophism had been overworked to explain repeated transgressions and regressions within a single geologic period, Williams suggested that the alternating Upper Cretaceous sequence was deposited during various transgressive and regressive phases of the sea caused by a lack of balance between subsidence through loading of the sediments and deposition. That is, if the rate of deposition exceeds the rate of subsidence, regression will take place; if the rate of subsidence exceeds the rate of deposition, transgression will occur; if the two rates are balanced, there will be neither transgression nor regression unless, of course, there are other factors operating.

Regional knowledge of Upper Devonian paleogeography indicates the land area to the east to have been one of relatively low relief and altitude. The adjacent depositional area on the west was probably shallow and gently sloping. Under such paleogeographic conditions, a slight lack of balance between deposition and subsidence would have resulted in some advance or retreat of the sea.

In addition to transgression and regression of the sea R. C. Stephenson[5] has mentioned two other factors which may influence the relative position of the shore line and the loci of deposition: (1) Streams flowing out over a low-lying land mass will shift laterally from time to time locally changing the source of material and the outline of the sea-land margin; (2) Shifts in currents caused by regional diastrophism, local sedimentation changes, and climatic variations may effect the shore line and also change the loci of deposition and/or erosion.

The question arises as to whether the Gordon, Fourth and Fifth sand bars were formed during an emergent (regressive) or submergent (transgressive) stage of the sea. Regional studies may reveal more concerning this question. The writer believes, however, that the bars

[5] Oral communication.

may have been formed during either stage. It has become almost axiomatic to associate offshore bars with emergent shore lines, but as Shepard (1948) has shown, bars can also be developed (and are presently being formed) during submergent phases of the sea.

From the foregoing discussion it is obvious that all sands called "Fifth" for instance, are not of the same age—they transcend time lines. In a transgressive phase, the most seaward sand of a cycle is the oldest geologically, and the most landward the youngest; in the regressive phase the opposite is true. This concept is illustrated in Figure 8, page 36. It is noteworthy that the line of time equivalence is not parallel to sea level but is related principally to the configuration and slope of the sea floor.

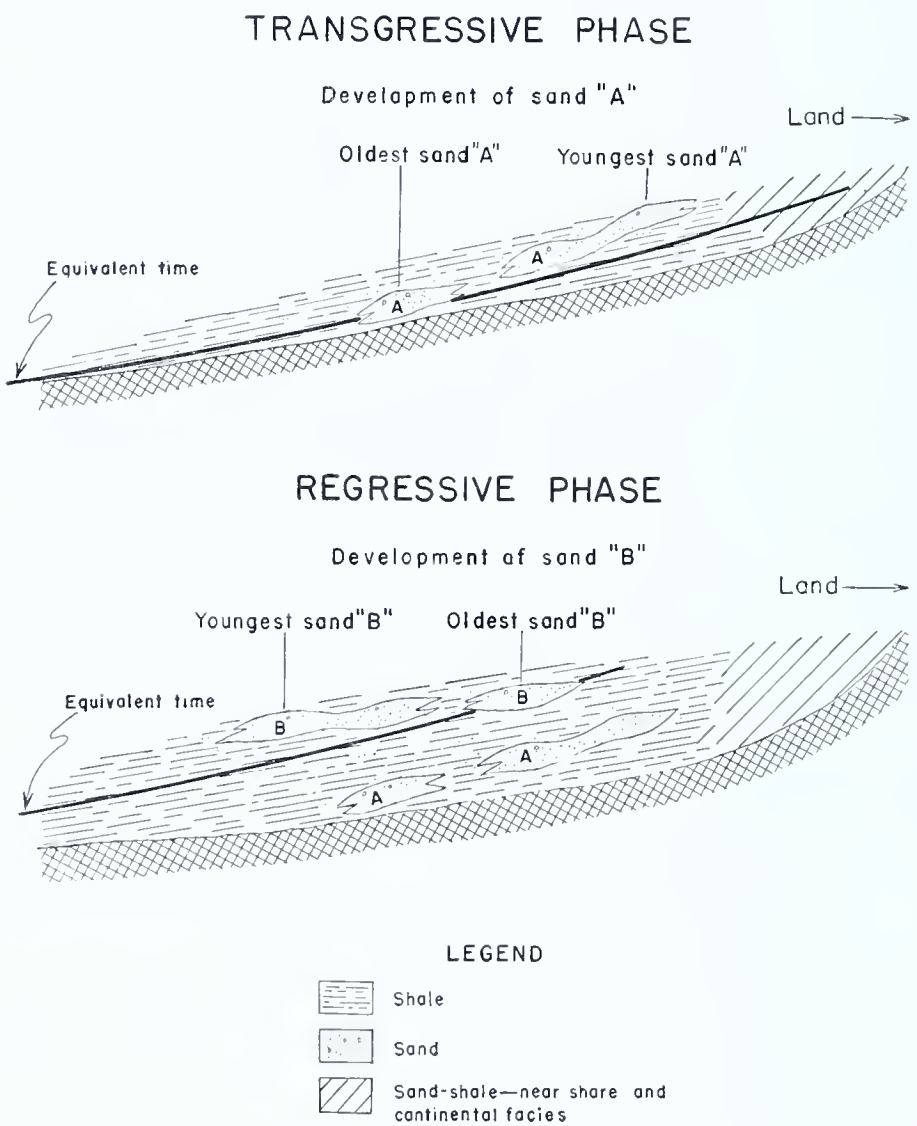

Figure 8. Diagram showing sand development during marine transgressions and regressions.

STRUCTURE AND SAND MAPS

Plates 3, 4, and 5, show the structure on the top of the Gordon, Fourth, and Fifth sands, respectively, producing wells, wells which have had shows, and dry holes in each of these sands. The purpose of the maps is to indicate (1) which areas have been explored by wells, and (2) the sands which have been penetrated in the various tests. All areas which have been tested through the Fifth sand, for example, can be quickly ascertained from the Fifth sand map. All wells shown as oil and/or gas producers on this particular map are productive from the Fifth sand, while all dry holes indicate tests which have been drilled into or penetrated the Fifth sand section without obtaining production from it. No attempt has been made to indicate those tests which were dry because the sand was present but poorly developed or absent, for few records are sufficiently detailed to supply this information.

A word of caution is advisable to users of the Gordon, Fourth, and Fifth sand maps. A dry hole on the Fifth sand map, for example, does not necessarily mean the well was dry in all sands; it merely means the well was dry in the Fifth. It may have been productive from the Fourth, Gordon, or higher sands and if so, this is represented on another map. Numerous wells have produced from more than one sand. Many of those drilled in the McDonald field, for instance, have furnished oil from both the Gordon and Fifth sands.

Plate 2 is a composite map showing all wells drilled in the entire area—producing wells, dry holes, and those which have had shows. This composite map, the three maps showing production by sands (pls. 3, 4 and 5), and a pool outline map (pl. 6), all taken together, will show in detail which areas are productive and from what sand or sands production has been obtained.

Maps showing pool outlines reveal many isolated areas of production (usually gas) outside the main producing trend of a particular sand. It is possible that, in many instances, these patches of production are connected with and represent a spur or offshoot from the main sand body. In most cases, however, no connection is indicated between the two productive areas.

PRODUCTION AND PRODUCTION METHODS

PRODUCTION

Cumulative production data for the entire area are not included in this report since the pipe line available statistics include various oil-producing areas outside the fields discussed in this bulletin and the time required for a lease by lease tally is not justified. Munn (1911, pp. 44-45) presents a table and a graph showing production by years from 1890 to 1909 for a group of fields or pools the majority of which are within this investigation. His data indicates cumulative production to the first half of 1909 amounting to 42,135,000 barrels; extrapolating his decline curve through 1948 adds approximately 7,000,000 barrels additional, or a total of 49,135,000 barrels. This is probably a maximum

figure. Conservatively, 45,000,000 barrels should be a fairly close approximation of the cumulative production of the fields described in this study.

Present monthly production figures are discussed in the foregoing field descriptions.

DRILLING AND PRODUCTION METHODS

Wells are drilled with standard cable tool rigs. Casing practice varies somewhat, depending on the presence or absence of water sands. The following illustrates the various casing which may be used:

10"	through the Pittsburgh coal
8" or 8¼"	through Dunkard, First Gas or Salt sands
6¼" or 6⅝"	in Big Lime or Big Injun
4⅞", 5", or 5 3/16"	through Hundred Foot-Fifty Foot sands if they contain water or through the Gordon in the southern and southwestern part of the McDonald field where it is water bearing.

The last string of casing may not be used if excessive water is not found in the Big Injun or deeper sands. Two inch tubing is set to the bottom of the well.

Wells in the area are pumped with individual beam units using wire line or wooden sucker rods. Pumping schedules vary with the amount of fluid produced, but average twice a week.

The amount of water presently produced with the oil is extremely variable, but the following figures are average oil-water ratios for the various sands: Gordon—50-60 per cent oil, 40-50 per cent water; Fourth 40 per cent oil, 60 per cent water; Fifth, 60-80 per cent oil, 20-40 per cent water.

Shooting practices vary with the sands but, in general, the top of the shell is placed 3 feet below the top of the sand and an average of 30 to 50 quarts of nitroglycerin is used. The matter of shooting and oil-well reconditioning in southwestern Pennsylvania has been discussed in detail recently by Grant (1948).

Both primary and secondary methods of production are used. Secondary methods are: (1) Vacuum, applied to the Fifth sand. This method has not been successful in the Gordon as it decreases rather than increases Gordon production. (2) Gas injection in the Gordon sand; this program is described in detail in Part II of this bulletin.

ACCIDENTAL WATER FLOODS

The common belief that the Venango or Conewango sands are not amenable to secondary recovery of oil by water flooding has been seriously questioned of late. The results of accidental or natural water flooding in this area, are, therefore, most interesting. Numerous instances can be cited to show that natural floods have greatly increased

oil production in both the Gordon and Fifth sands in the McDonald field. On the K. McDonald lease in the southwestern part of the field, oil wells have shown gradual increases in monthly production of 10 to 50 barrels over a period of years. Similar increases have been noted on the J. M. Stilley lease south of Primrose. Both the McDonald and Stilley leases are producing from the Fifth sand. Over a period of 35 years, production from a Gordon sand well on the T. B. Robbins tract, southeast of Midway, has increased from 15 barrels a month to its present production of 112 barrels a month. Increases in Gordon sand production due to natural floods have also occurred on the Prevost, Moses, and McBurney leases in the southwestern part of the field. In the Hopper field the Fourth sand has also shown response to natural water flood. The Arthur Hopper No. 5 well, which in 1926 was making 120 barrels per month, produced at a rate of 160 barrels per month in 1947. There may be other instances of increased oil production due to natural water flood with which the author is not acquainted. The apparent results of the natural floods cited suggest that conditions may be favorable for controlled water flooding in the secondary recovery of oil in these sands.

The planning of a secondary recovery project is hampered by the lack of cores from which detailed sand data may be obtained. Further, redrilling in order to obtain detailed stratigraphic data of the producing sands is too costly because of the depth of the sands. In lieu of redrilling in the McDonald field, and in the absence of cores, methods proposed by Squires (1948) appear to have application in this area. He has suggested that the

> "relative permeability of the sands around different input wells may be measured by the difference in the amount of pressure required to inject the same volume of gas into each. The continuity of a sand may be determined by injecting a tracer gas into an input well and recovering it from output wells. . . . Relative permeabilities of the sand between input and surrounding output wells may be measured by speed of travel of injected gas. When injection is begun on a new operation the time required for injected gas to reach each output well is noted and a map of the area is contoured with lines representing equal time intervals. The resulting picture gives measurements of relative permeabilities. This may be done at any later time by using a tracer gas, noting the time of arrival of the tracer at the output wells and drawing a contour map as above. . . . It is clear that these methods measure the average permeability of the sand body and do not indicate vertical variations in the permeabilities of the sands tested. Such vertical variations may be measured in any input well by filling the sand bore foot by foot, with a removable seal and measuring the input volumes produced by uniform pressure for each of the diminishing areas of the exposed hole. From such records the relative permeability in terms of volume rate of injection of gas may be figured for each foot of sand."

Squires' method to obtain vertical variations in the permeability of a sand may be precluded in many wells since shooting of the sands has greatly enlarged the bore hole and a conventional packer could not be set. It is possible that some relatively impermeable substance, such as clay, could be used in place of a standard packer and subsequently drilled out. The method of obtaining the average permeability of the sands seems to be applicable. It is true, however, that without core data the results cannot be translated into quantitative relative permeability measurements of the sands, but the comparative data obtained from coring would be useful in planning a secondary recovery program.

It is highly probable that large quantities of oil remain in the Gordon and Fifth sands which cannot be recovered by primary methods. Techniques such as those proposed by Squires may aid in extending the productive life of the McDonald field for many years by aiding in the application of secondary methods.

Acknowledgments

The author acknowledges the assistance rendered by the many companies and individuals who have contributed data on the various fields. The South Penn Oil Company, major lease holder in the area, particularly Mr. L. S. Matteson and Mr. Vernon Walters, and numerous field men of that company, generously aided in this study. Other companies who furnished information are: Chartiers Oil Company, Equitable Gas Company, Fisher Oil Company, E. H. Jennings Bros. Oil Company, Manufacturers Light and Heat Company, Peoples Natural Gas Company, Dr. C. R. Fettke, Mr. John Galey, and Dr. R. E. Sherrill. Mr. E. M. Tignor and Mr. W. M. Nabors of the United States Bureau of Mines have written Part II of this report describing the gas repressure project in the McDonald field. The Bureau of Mines has also made the crude oil analyses included in the appendix. Property-line data for the base maps have been obtained from the Washington County office of the United States Department of Agriculture and from the Allegheny County Planning Commission.

Maps included with this report have been prepared by Miss Margaret Cox and Miss Lillian Heeren of the Survey staff. During the course of the study the following part-time assistants have at various times aided in a field check and compilation of data: Messrs. J. R. Ebright, Harry Gouse, D. Lippincott, D. J. Miles and W. M. Tindell.

PART II

SECONDARY RECOVERY OF OIL IN THE McDONALD FIELD IN SOUTHWESTERN PENNSYLVANIA[6]

BY

E. M. TIGNOR[7] AND WM. M. NABORS[7]

Introduction

In contrast to the widespread use of compressed air and/or air and natural-gas mixtures for injection to stimulate the recovery of oil from the shallow sands of Venango County, Pa., only a few secondary-recovery projects are being operated in the southwestern part of the state (Dickey and Bossler, 1942). In that area the oil sands are at greater depths than farther north, where injection of air and natural gas has been successful in the secondary recovery of oil. In general, the operators in southwestern Pennsylvania have hesitated to initiate gas-injection projects because natural gas is scarce and relatively expensive in that area, and the use of straight air is not considered practical because of contamination of the remaining natural gas in the oil sands. Another aversion to the injection of straight air is due to the resulting corrosion of well and oil-field equipment in the extended life of a secondary-recovery project developed with relatively wide well spacing because of the depths of the oil-producing sands.

A gas-injection secondary-recovery project was begun in 1932 by the South Penn Oil Co. on the 13,000-acre McDonald oil field in Allegheny and Washington Counties, Pa., about 12 miles southwest of Pittsburgh. The gas used for injection in the project was 70 per cent natural gas and 30 per cent air because it was necessary to maintain approximately that mixture to supply the demand for casing-head gasoline. In a preliminary study of the project made in 1942, Bureau of Mines engineers found that this gas was injected into the oil reservoir through only 12 injection wells, yet the rate of oil production was stimulated on 29 leases covering an area of 3,200 acres. With the increased interest in secondary recovery of oil, there have been many inquiries regarding the Bureau of Mines project in the McDonald field. Consequently, this report has been prepared to describe the secondary recovery operations in that field.

The gas-injection project is described briefly, and a more detailed study of a smaller area containing the Wallace Heirs lease is included. The results of electrolytic model studies are presented.

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Field Development

Studies by members of the Pennsylvania Topographic and Geologic Survey show that the area of the McDonald field is approximately 13,000 acres. More than 1200 oil wells were drilled through the Gordon and/or the Fourth and Fifth sands between 1892 and 1916, and most of them were completed between 1892 and 1897. The wells averaged 2,350 feet in depth, and the average interval from the top of the Gordon sand to the bottom of the Fifth sand is 150 feet. The wells were drilled with cable tools before the era of coring and electrical logging. The pay zones exposed in each well were shot with 1 to 3 quarts of nitroglycerin per foot of sand. Recorded initial daily production ranged from 3 to 900 barrels of oil per well in the part of the field where secondary-recovery operations subsequently were started. The original casing strings usually were 6 inches in diameter and about 1,200 feet long. Approximately one-third of the original wells were in service in 1932, the others having been abandoned before secondary-recovery operations were initiated. No new wells were drilled for the gas-injection project.

Figure 9. Map showing location of leases and wells in the McDonald field gas-injection project.

SECONDARY-RECOVERY OPERATIONS

GENERAL STATEMENT

In 1932 the South Penn Oil Co. started injecting the mixture of 70 per cent processed casing-head natural gas and 30 per cent air into the reservoir through the first of 12 injection wells for the secondary-recovery of oil. The gas-injection operations increased the rate of oil production on 29 leases within an area of 3,200 acres containing 125 active oil-producing wells (fig. 9).

Vacuum operations had been in effect, in the area shown in Figure 9, since 1920. The system had maintained a vacuum of 25 inches of mercury at the casing heads of the wells; and, after gas-injection operations were begun in 1932, the vacuum was reduced gradually until 1934, when it was dissipated completely. During secondary-recovery operations the former vacuum system was used for gas gathering, and a back pressure of 6 p.s.i.g. was maintained on the casing heads of the oil-producing wells. Table 2 (in two parts) gives the annual oil production for each lease in the project for the period 1892 to 1941 inclusive.

The injection of gas was begun in April, 1932, through W. F. Woods well No. 6, which had been drilled only through the Gordon sand. The gas was introduced at the casing head and flowed through the annulus between the casing and the tubing. The tubing and pumping equipment were left in the well for liquid removal if necessary.

In September, 1932, gas injection was started through W. A. Dickson well No. 5, which had been drilled through the Fifth sand, and a pay zone had been logged in each of the Gordon, Fourth, and Fifth sands. In converting this oil-producing well to a gas-injection well, a 2-by 6-inch anchor packer was set between the Fourth and Fifth sands, with the 2-inch tubing perforated opposite the Fifth sand. The injection gas for the Fifth sand was introduced through the tubing; the gas for the Gordon and Fourth sands was introduced through the casing Tests proved that a well-head pressure of 250 p.s.i.g. was necessary to inject gas into the Fifth sand at that location. As it was necessary to keep the processed-gas pressures no higher than 100 p.s.i.g to eliminate condensation in the gas-injection system, no gas was injected into the Fifth sand through W. A. Dickson well No. 5 after the initial tests.

The third well converted for gas injection was Wallace & Miller well No. 1. Although this well had been drilled through the Fifth sand, it had been plugged back to a depth just below the Gordon sand before it was completed originally as an oil producer. For injection purposes the gas was introduced through the casing; tubing and pumping equipment were left in the well. Gas injection was started through this well in March, 1933.

In July, 1933, gas-injection operations were begun at the James Scott well No. 4, and in August, 1933, gas injection was started through Richard Gladden well No. 16. Both of these wells were open through the Fifth sand, and gas was introduced through the casing strings. The tubing and pumping equipment were left in both wells.

TABLE 2. *Annual oil production by leases in the McDonald field gas-injection project, barrels.*

YEAR	Robb Heirs	M. W. Campbell	Jas. McEwen	Jas. Kirk	Wallace Heirs	W. A. Dickson	Andrew Shane	N. G. Cook (Allegheny County)	R. D. Potter	Wallace & Miller	W. F. Woods	Dr. G. H. Miller	N. G. Cook (Washington County)	Richard Gladden	W. B. Moorhead
1892		9,735[1]	26,857[1]	7,047[1]			8,354[1]			8,173[1]				40,813[1]	
1893		16,212	44,724	11,735		23,874[1]	13,912			13,611				67,965	
1894		13,499	37,239	9,771	33,846[1]	39,757	11,584			11,333			8,248[1]	56,590	
1895	9,036[1]	11,240	31,007	8,136	56,363	33,103	9,645	2,800[1]	3,151[1]	9,436	8,601[1]	9,807[1]	13,736	47,119	8,094[1]
1896	15,047	9,359	25,818	6,774	46,930	27,563	8,031	4,662	5,248	7,857	14,323	16,332	11,437	39,233	13,478
1897	12,529	7,793	21,497	5,640	39,076	22,950	6,687	3,882	4,370	6,542	11,926	13,599	9,523	32,667	11,222
1898	10,432	6,489	17,899	4,696	32,536	19,109	5,568	3,232	3,639	5,447	9,930	11,323	7,929	27,200	9,344
1899	8,686	5,403	14,903	3,910	27,091	15,911	4,636	2,691	3,030	4,535	8,268	9,428	6,602	22,648	7,780
1900	7,232	4,499	12,409	3,256	22,557	13,248	3,860	2,241	2,523	3,776	6,884	7,850	5,497	18,858	6,478
1901	6,022	3,746	10,332	2,711	18,782	11,031	3,214	1,866	2,101	3,144	5,732	6,536	4,577	15,702	5,394
1902	5,014	3,119	8,603	2,257	15,639	9,185	2,676	1,554	1,749	2,618	4,773	5,442	3,811	13,074	4,491
1903	4,175	2,597	7,163	1,879	13,022	7,648	2,228	1,294	1,456	2,180	3,974	4,531	3,173	10,886	3,739
1904	3,753	2,316	6,719	1,689	9,921	7,232	2,216	1,164	2,145	1,960	3,914	3,511	2,473	8,041	2,970
1905	3,411	1,684	6,067	1,624	9,757	6,198	2,200	1,964	2,475	1,920	2,986	3,402	2,482	5,904	2,599
1906	3,393	1,768	5,067	1,340	10,896	6,650	1,774	1,112	1,883	1,741	4,662	2,428	2,267	6,557	2,527
1907	3,441	1,402	4,613	1,009	9,369	6,352	2,159	1,185	1,311	1,891	4,890	2,773	2,082	6,463	2,365
1908	2,641	664	3,760	1,128	8,686	5,482	1,500	916	1,117	1,518	6,578	2,105	1,843	5,642	2,245
1909	2,296	788	2,774	806	7,650	4,739	1,071	764	949	1,781	6,714	1,869	1,870	4,978	2,113
1910	2,242	687	2,206	960	6,434	4,333	757	665	869	1,682	5,952	1,658	1,177	4,759	2,097
1911	2,569	936	2,872	1,030	8,059	4,071	794	828	930	1,392	6,148	1,517	998	4,471	2,095
1912	2,670	935	2,886	860	6,404	3,368	676	658	929	1,297	5,708	1,217	721	3,948	2,057
1913	2,711	830	2,879	831	6,804	3,276	685	719	792	1,216	5,821	1,071	638	3,819	3,050
1914	2,351	854	2,417	817	6,467	3,373	639	589	455	1,608	4,070	957	632	3,453	2,944
1915	2,308	778	2,688	784	4,933	2,960	663	551	229	1,988	2,957	825	548	3,263	3,288
1916	2,136	764	2,891	759	4,222	2,695	669	505	159	1,666	3,966	828	335	3,243	3,342
1917	2,025	682	2,518	639	3,584	2,312	671	322	194	1,397	4,090	1,052	443	2,928	3,006
1918	2,204	514	2,187	690	2,827	2,086	589	21	125	1,364	3,716	581	640	2,759	2,157
1919	2,040	597	1,841	633	2,766	1,907	346	159	200	1,094	3,687	719	288	2,375	2,069
1920	1,641	481	1,489	558	3,260	1,910	544	61	115	846	3,335	663	526	2,132	1,822
1921	1,319	471	1,441	650	3,212	1,734	387	97	198	1,089	3,498	886	533	1,428	1,438
1922	1,029	523	1,522	668	3,176	1,768	355	33	192	978	3,246	799	527	1,359	1,594
1923	1,083	442	1,831	604	2,446	1,732	390	69	210	912	2,902	806	497	829	1,377
1924	377	490	1,727	615	2,455	1,553	335	138	181	894	2,457	592	343	860	1,281
1925	1,064	470	2,001	566	2,651	1,408	285	57	174	776	3,191	765	433	895	1,238
1926	895	405	1,576	448	2,414	1,618	184	105	153	701	3,574	649	383	977	1,040
1927	802	337	1,303	477	2,367	1,389	174	136	120	728	3,368	825	366	1,149	1,173
1928	658	343	1,231	505	2,293	1,405	185	127	119	346	3,057	916	425	1,066	1,001
1929	521	491	1,224	518	2,184	1,369	114	115	139	355	2,818	1,198	438	283	1,322
1930	548	350	1,021	397	1,905	1,261	197	126	88	250	2,037	753	311	847	1,804
1931	665	174	1,113	403	1,745	1,069	173	54	115	223	1,849	658	358	852	1,455
1932	445	170	665	329	1,767	1,005	202	53	111	531	3,313	1,337	365	753	1,301
1933	350	65	470	233	2,729	1,086	171	77	117	793	6,073	1,189	385	728	1,088
1934	686	134	856	375	8,065	1,963	314	185	30	856	6,742	1,095	587	734	1,314
1935	823	297	1,686	440	11,245	4,891	798	409	149	488	6,581	1,048	1,070	941	1,224
1936	232	98	1,912	383	13,279	4,751	936	377	266	742	5,620	1,386	797	868	1,073
1937	141	136	2,201	545	12,750	3,639	966	279	241	71	5,838	1,857	632	863	892
1938	184	201	2,704	630	13,125	2,573	554	38	194	721	3,990	2,038	517	830	700
1939	275	306	2,488	713	12,397	3,133	887	Zero	210	1,034	3,326	1,943	456	647	680
1940	336	Zero	1,402	726	11,238	2,703	880	11	271	1,064	3,390	1,837	414	620	566
1941	304	19	941	704	10,471	2,500	981	87	331	1,077	3,083	1,630	326	480	591
TOTAL	134,742	116,293	345,640	94,898	541,795	336,873	107,816	38,978	45,753	119,642	233,558	136,231	104,659	485,499	136,918

[1] Estimated from date of initial production to 1902, inclusive.

TABLE 2. *Continued.*

YEAR	M. Moorhead	J. D. Sauters	L. H. Springer	J. P. Scott	Wm. Patterson	J. W. Giffin	Samuel Connor	S. J. Cubbage	T. B. Robbins	P. C. Cuniff	McDonald Heirs	J. R. Gladden	Jas. Scott	Jas. A. Little	TOTAL PRODUCTION FOR ENTIRE PROJECT
1892											17,670[1]	52,436[1]			171,085
1893	10,932[1]	20,040[1]									29,425	87,321	30,841[1]		370,592
1894	18,204	33,373							9,347[1]		24,500	72,707	51,358		431,356
1895	15,157	27,788	5,037[1]	17,467[1]	2,421[1]	4,321[1]	1,387[1]	1,516[1]	15,566	567[1]	20,400	60,539	42,763	10,777[1]	486,980
1896	12,620	23,137	8,388	29,087	4,031	7,195	2,310	2,525	12,961	945	16,986	50,407	35,606	17,947	476,237
1897	10,508	19,265	6,984	24,219	3,356	5,991	1,923	2,102	10,792	787	14,143	41,971	29,647	14,943	396,534
1898	8,749	16,041	5,815	20,166	2,794	4,988	1,601	1,750	8,986	655	11,776	34,947	24,685	12,442	330,168
1899	7,285	13,356	4,842	16,791	2,326	4,153	1,333	1,457	7,482	545	9,805	29,098	20,554	10,360	274,909
1900	6,066	11,121	4,032	13,981	1,937	3,458	1,110	1,213	6,230	454	8,164	24,228	17,114	8,626	228,902
1901	5,051	9,260	3,357	11,641	1,613	2,879	924	1,010	5,187	378	6,798	20,173	14,250	7,182	190,593
1902	4,206	7,710	2,795	9,693	1,343	2,397	769	841	4,319	315	5,660	16,797	11,865	5,980	158,695
1903	3,502	6,420	2,327	8,071	1,118	1,996	640	700	3,596	262	4,713	13,986	9,879	4,979	132,134
1904	2,649	4,531	2,248	5,026	936	1,815	816	692	3,328	256	3,728	11,851	8,271	3,815	109,986
1905	2,232	3,948	2,060	6,586	1,687	1,904	568	629	2,968	225	3,277	10,895	8,918	2,838	103,408
1906	2,092	3,472	1,426	9,485	2,380	1,540	431	430	2,659	181	2,912	9,961	6,818	3,044	100,896
1907	1,428	2,947	1,190	7,379	2,411	1,477	122	295	2,261	232	2,597	8,847	4,753	2,781	90,025
1908	1,433	2,675	989	9,679	2,580	1,437	32	227	1,872	167	2,011	8,489	4,545	2,756	84,717
1909	1,638	2,153	890	9,685	2,252	4,404	22	184	1,688	168	2,293	7,241	4,786	2,316	80,882
1910	1,344	2,164	759	8,958	2,235	9,267	660	130	1,737	168	2,517	6,777	5,608	2,126	80,928
1911	1,376	2,395	977	9,120	2,568	9,491	992	121	1,245	127	2,303	8,198	7,351	2,247	87,221
1912	1,183	2,278	1,326	8,704	3,927	8,694	652	107	1,248	137	2,263	6,585	6,604	2,313	80,355
1913	949	2,144	1,172	8,401	3,704	8,358	320	46	1,237	85	2,247	5,269	6,059	2,381	77,514
1914	748	1,992	780	11,445	2,815	6,361	756	158	1,154	110	1,784	4,340	9,433	2,237	75,739
1915	848	1,377	609	12,190	2,111	6,019	542	106	999	37	1,797	3,760	8,178	2,984	70,320
1916	1,552	1,569	557	10,548	1,807	6,137	309	82	1,007	86	1,120	3,446	11,921	3,154	71,475
1917	1,310	2,317	487	9,208	1,605	5,200	944	122	662	77	1,333	3,096	12,904	2,196	67,324
1918	1,412	3,480	498	8,749	1,664	4,865	1,041	113	858	81	1,923	3,479	13,611	2,563	66,797
1919	1,258	3,141	318	8,384	1,559	4,173	908	64	829	72	2,560	4,123	8,252	2,588	58,950
1920	1,101	2,917	109	7,196	1,672	3,736	722	38	680	55	2,085	3,669	4,780	2,593	50,736
1921	990	3,106	185	6,636	1,717	3,990	574	77	623	54	2,123	3,103	3,386	2,609	47,554
1922	880	3,010	134	8,116	1,586	3,875	503	77	572	62	1,896	3,715	2,876	2,604	47,675
1923	1,168	2,727	184	7,756	1,581	3,870	505	30	653	49	1,919	3,085	2,800	2,551	45,008
1924	1,653	2,671	210	7,282	1,535	3,712	390	33	606	37	1,840	2,695	2,566	2,397	41,925
1925	1,318	2,677	160	7,042	1,375	3,650	379	39	645	53	1,849	2,757	2,135	2,397	42,450
1926	1,152	2,333	145	6,412	1,602	3,293	352	33	632	40	1,828	2,734	2,132	2,291	40,101
1927	1,118	2,397	157	6,643	1,772	2,611	345	38	730	31	1,703	2,887	3,381	2,254	40,781
1928	1,090	2,245	138	6,817	1,727	2,536	326	37	628	35	1,920	2,800	2,470	2,233	38,679
1929	896	2,240	137	6,495	1,765	1,872	277	33	529	33	449	2,863	2,521	2,245	35,444
1930	924	2,652	89	5,861	1,639	1,909	290	53	311	29	1,894	2,496	3,395	2,180	35,617
1931	954	2,566	120	5,169	1,309	1,749	239	30	431	39	1,594	2,281	3,292	1,982	32,661
1932	1,039	2,253	106	5,053	1,316	1,607	202	31	267	30	1,362	1,984	2,280	1,824	31,701
1933	1,101	2,205	113	5,077	1,348	1,658	223	Zero	235	32	1,649	2,359	2,573	1,854	35,981
1934	973	2,053	79	6,107	1,542	1,694	219	35	235	30	1,535	2,729	3,320	1,872	46,359
1935	983	1,859	87	5,902	1,269	2,032	270	Zero	259	14	1,300	2,531	3,276	1,713	53,585
1936	912	1,673	86	5,720	1,381	2,113	270	Zero	303	Zero	1,343	2,374	3,170	1,720	53,785
1937	888	1,492	83	5,252	1,127	1,966	318	16	379	31	1,920	2,519	3,194	1,609	51,845
1938	722	1,173	86	4,532	1,055	1,853	313	25	434	19	2,359	2,269	3,140	1,375	48,354
1939	740	1,383	56	4,414	964	1,766	232	30	349	30	1,973	2,128	2,672	1,425	46,657
1940	688	1,605	56	4,370	788	1,340	285	30	392	23	1,599	2,183	2,603	1,223	42,633
1941	641	1,460	57	4,516	769	1,705	197	27	358	23	1,193	1,963	2,509	1,197	40,140
TOTAL	147,663	278,791	62,440	427,031	88,009	173,057	28,543	17,332	120,469	7,866	244,038	669,091	481,045	179,723	5,904,393

[1] Estimated from date of initial production to 1902, inclusive.

J. D. Sauters well No. 2, which had been drilled through the Fourth sand, was the sixth gas-injection well in the project. A 2-by 6-inch anchor packer was set between the Gordon and Fourth sands, with tubing perforations opposite the Fourth sand so that the gas for that zone could be introduced through the tubing whereas the gas for the Gordon sand flowed through the casing. Gas injection through this well was begun in September, 1933, but in 1934 gas injection to the Fourth sand through this well was discontinued.

Conversion of three other Gordon sand wells for gas-injection purposes followed in rapid order. In October, 1933, the James McEwen well No. 10 was converted to a gas-injection well; in May, 1934, the Andrew Shane well No. 4 was fitted to take gas; and in August, 1934, gas injection was begun through the M. W. Campbell well No. 7. In each of these wells the injection gas was introduced through the casing.

The next wells converted for gas injection were J. P. Scott well No. 16 (in 1935) and J. W. Giffin well No. 9 (in 1936). Both wells were open to the Gordon and Fourth sands, and gas was introduced through the casing of each. The twelfth (and last) well to be converted for gas injection was McDonald Heirs well No. 10 (in 1936), which had been drilled through the Fifth sand; in this well the Fourth sand was not productive of oil. Gas was injected into the Gordon and Fifth sands through the tubing; a 2-by 6-inch packer was set above the Gordon.

Although the operating pressure of the injection-gas system was 100 p.s.i.g., pressures at the well heads of the injection wells usually ranged from 65 to 100 p.s.i.g. For controlling the rate of flow of gas, a throttling valve was provided at each injection well; also an orifice and connections for a manometer and a pressure gauge were provided at each injection well so that the volumes of gas being injected could be measured. Table 3 gives the volumes of gas injected annually into the oil-bearing sandstones through each of the injection wells for the years 1932-41, inclusive. It is the opinion of the operators of the project and the writers that at least 90 per cent of the injected gas entered the Gordon sand.

It is apparent from the annual oil-production data given in Table 2 that the rate of oil production from each of the leases increased after 1931. For some of the leases, the gains in oil production are pronounced, although some others show only slight increases. It must be borne in mind that only 12 injection wells were used although there were 125 oil-producing wells.

WALLACE HEIRS LEASE

The Wallace Heirs lease (fig. 10) received a more effective gas-drive than the average lease in the McDonald field secondary-recovery project by virtue of the location and concentration of gas-injection wells in the vicinity of that lease. Three injection wells—Wallace & Miller well No. 1, W. A. Dickson well No. 5, and James McEwen well No. 10—provided gas drives that were particularly beneficial in increasing oil

TABLE 3. *Volumes of gas in MCF injected annually through each of the injection wells in McDonald field.*

YEAR	W. F. Woods No. 6	W. A. Dickson No. 5	Wallace & Miller No. 1	Jas. Scott No. 4	R. Gladden No. 16	J. D. Sauters No. 2	Jas. McEwen No. 10	Andrew Shane No. 4	M. W. Campbell No. 7	J. P. Scott No. 16	J. W. Giffin No. 9	McDonald Heirs No. 10	TOTAL
1932	13,403	3,267											16,670
1933	9,161	17,148	17,535	5,054	6,063	4,753	5,051						64,765
1934	7,727	13,340	12,911	4,534	17,590	6,198	11,917	6,344	3,378				83,939
1935	9,230	10,707	11,147	4,941	15,243	2,440	12,895	9,535	1,111	608			77,857
1936	11,060	11,086	9,040	4,887	174	Zero	12,488	8,794	Zero	10,494	6,295	1,105	75,423
1937	11,444	10,599	10,765	4,994	Zero	Zero	12,316	10,468	Zero	5,479	5,400	9,956	81,421
1938	11,477	11,111	11,168	5,114	Zero	Zero	11,321	4,840	4,423	435	3,679	11,180	74,748
1939	12,274	10,936	10,948	4,959	Zero	Zero	10,890	10,877	6,507	Zero	2,267	10,790	80,448
1940	11,583	5,399	7,128	4,606	Zero	Zero	6,528	6,070	1,112	Zero	173	2,582	45,181
1941	12,238	6,557	5,513	3,693	Zero	Zero	7,091	11,025	557	Zero	Zero	3,590	50,264
TOTAL	109.597	100,150	96,155	42,782	39,070	13,391	90,497	67,953	17,088	17,016	17,814	39,203	650,716

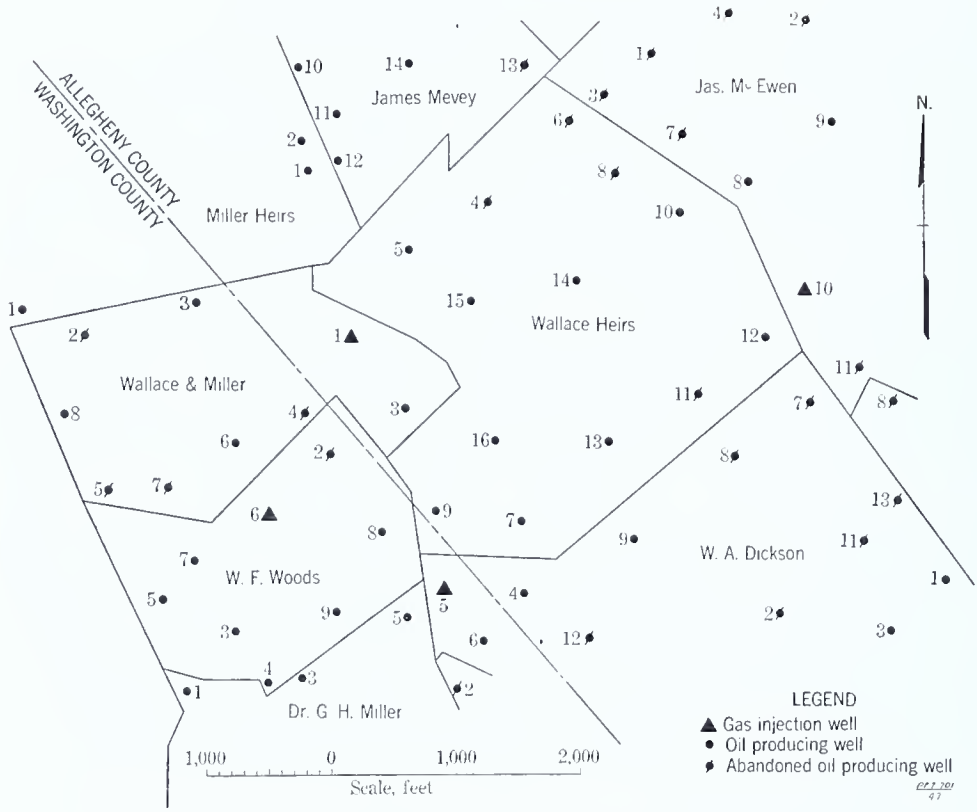

Figure 10. Detailed map of Wallace Heirs lease, McDonald field.

recovery on the Wallace Heirs lease. From data available on the operations within the area shown in Figure 10, it was estimated that one-half of the gas injected through the injection wells listed above served to stimulate oil-production rates on the Wallace Heirs lease.

Figure 11 shows the volumes of produced oil and injected gas, and the injection-gas:oil ratio for the Wallace Heirs lease, by years, for 1925-48, inclusive. The data for 1942-48 were estimated from incomplete records whereas for 1925-41 complete records of oil produced and gas injected were available. An outstanding feature brought out by the data plotted on Figure 11 is that the injection-gas:oil ratio was between 800 and 2,300 cubic feet per barrel of oil produced except for 1933, when the ratio reached a peak of approximately 7,500 cubic feet per barrel. The produced oil declined from 2,651 barrels in 1925 to 1,745 barrels in 1931 and then reached a peak of 13,279 barrels in 1936, after secondary-recovery operations had been in force for 4 years.

The method of estimating the ultimate oil gained from the Wallace Heirs lease by secondary-recovery operations is illustrated in Figure 12. The annual production was plotted on the logarithmic scale against years on the uniform scale of a semilogarithmic chart. The primary-production data and the secondary-recovery data were extrapolated to the assumed limit of economic production of 1,080 barrels of oil per year, based on a production of 120 barrels of oil per year from each of the oil-producing wells. If secondary-recovery operations had not

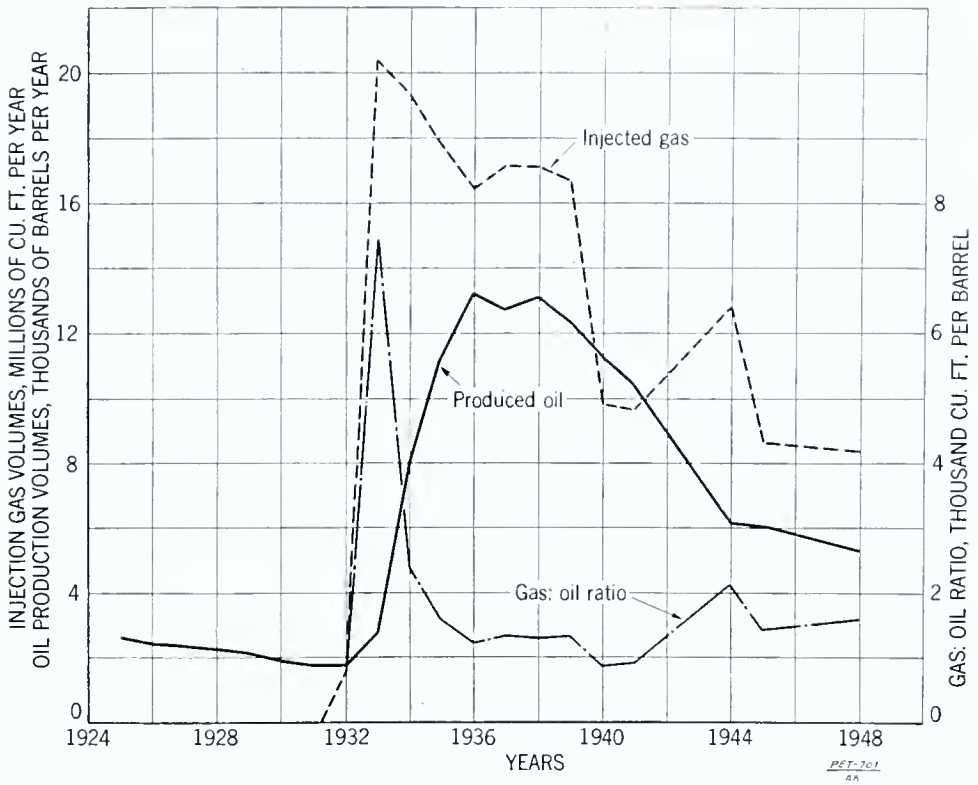

FIGURE 11. Production history of Wallace Heirs lease, McDonald field, for the period 1925 to 1948, inclusive.

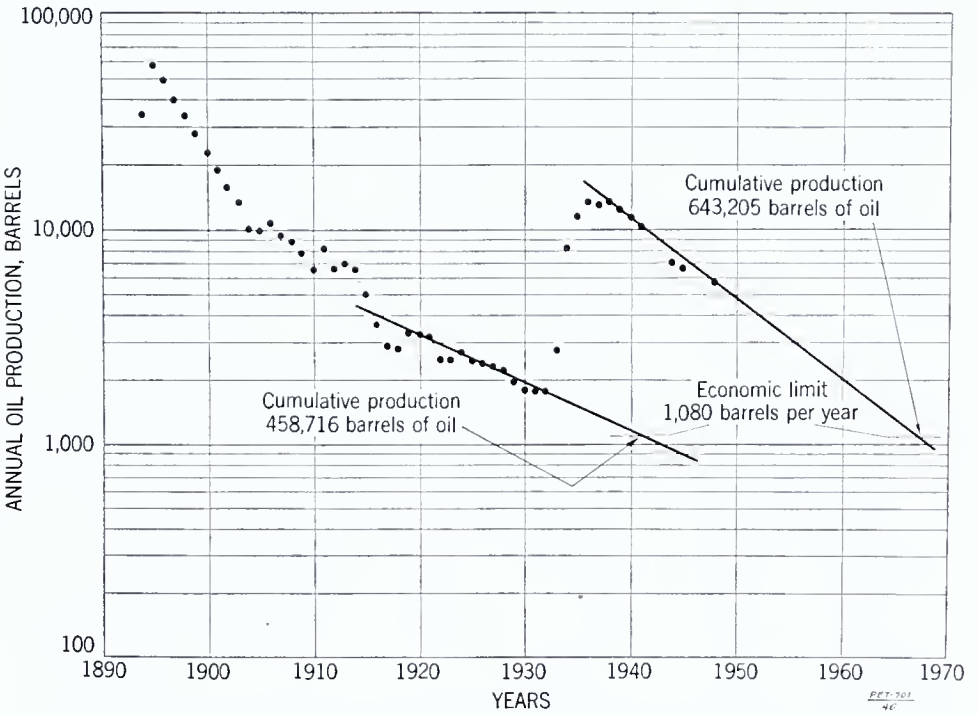

FIGURE 12. Graphic method used in estimating the ultimate oil gained by gas-injection operations, Wallace Heirs lease, McDonald field.

been initiated, the economic limit of oil production would have been reached in 1942 when the cumulative production from the lease would have amounted to 458,716 barrels of oil. The trend of production as indicated during secondary-recovery operations shows that the economic limit of production will be reached in 1968, at which time the cumulative production will amount to 643,205 barrels of oil. The difference between the two cumulative productions indicates that 184,489 barrels of oil will be gained as a result of the secondary-recovery operations.

Electrolytic Model Studies

Tests were run with an electrolytic model, similar to that described by Botset (1945), to determine the area that furnished the indicated quantity of gained oil. Figure 13 shows the results of test A, which was arranged to simulate actual operating conditions in the area bounded by the dashed lines. The current inputs for the injection wells were adjusted in the same proportion as the gas volumes injected through Wallace and Miller well No. 1, W. A. Dickson well No. 5, and James McEwen well No. 10 (fig. 10), that is, 19, 20, and 18 milliamperes, respectively. The test was continued until the injection medium reached Wallace Heirs well No. 14—the last producing well to be reached. The contour lines in Figure 13 show the progress of the drives. The shaded portions of the illustration indicate the areas which furnished the oil gained by the secondary-recovery operations in the Wallace Heirs lease. The effective area was found to be 155 acres.

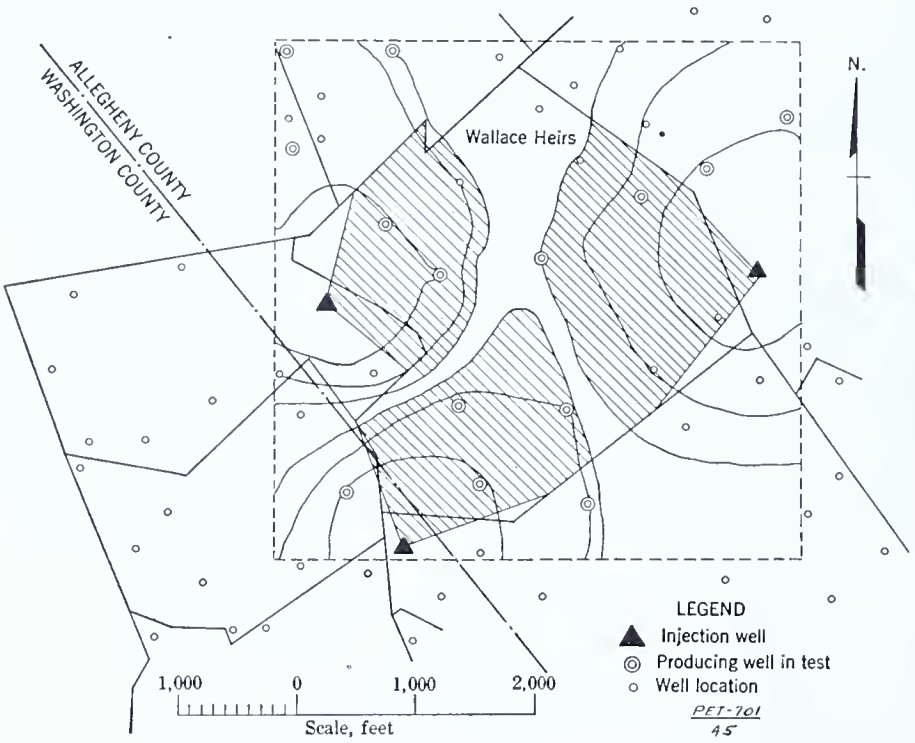

Figure 13. Diagram showing results of electrolytic model test A, which indicates the behavior of the actual injected gas drives in the area of the Wallace Heirs lease. See page 51 for description of test A.

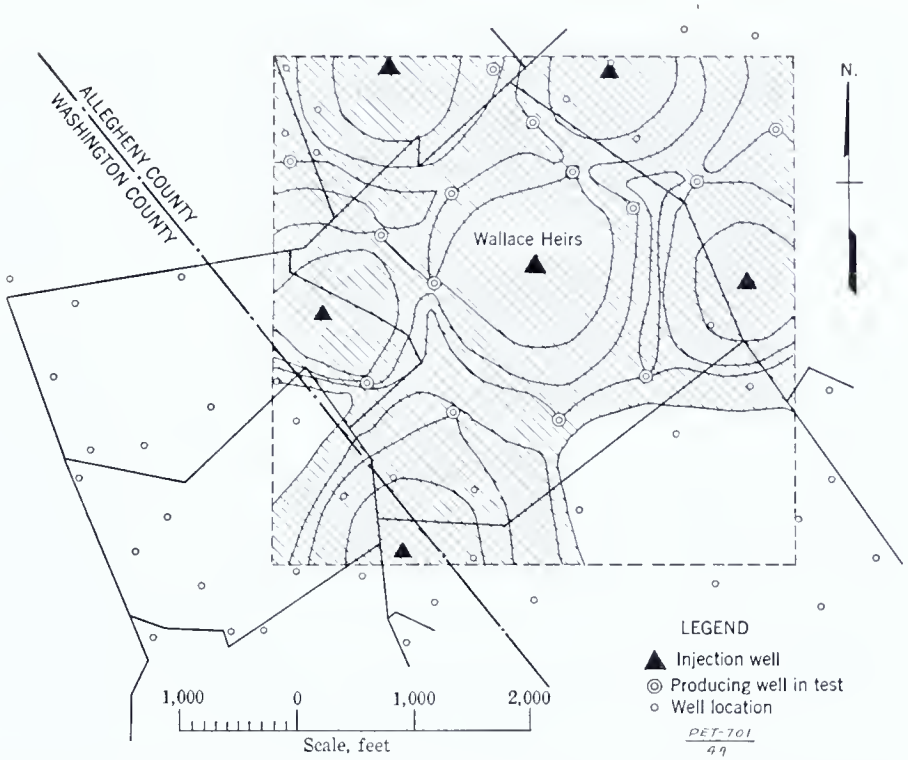

FIGURE 14. Diagram showing results of electrolytic model test B, which indicates the behavior of the actual injected gas drives in the area of the Wallace Heirs lease. See page 51 for description of test B.

Consequently, the gained oil (184,489 barrels) resulted in a recovery of 1,190 barrels per acre by secondary methods. Based upon an effective pay-sand thickness of 11 feet, which is the estimated average pay-sand thickness of the Gordon sand in the Wallace Heirs lease, the secondary-recovery operations increased the recovery of oil from the indicated area by an amount equivalent to 108 barrels per acre-foot of pay sand.

Test A (fig. 13) indicates the behavior of the actual injected gas drives in the area included in the test. The total input current was 57 milliamperes and the test was continued for 7.1 hours. Considerable well interference, and consequent production of the injection medium, resulted from the pattern arrangement of injection and producing wells. Test B (fig. 14) was arranged to make better use of existing well locations, some of which were wells abandoned before secondary-recovery operations were begun in the McDonald field.

In test B six injection wells were used with a total current input of 70 milliamperes; 10 into each of the edge injection wells and 20 into the center well and the test was continued for 4.6 hours. Contour lines (fig. 14) show the progress of the drives at intervals of time; the fourth contour represents the progress at the end of the test.

Table 4 gives a comparison of the electrolytic model tests. It will be noted that, with a current input of 322 milliampere-hours, test A swept 74.7 per cent of the test area and test B, with the same current

Table 4. *Comparison of electrolytic model tests A and B.*

CURRENT INPUT, MILLIAMPERE-HOURS	AFFECTED AREA, PER CENT OF TEST AREA	
	Test A	*Test B*
50	29.0	29.0
150	45.2	48.0
150	56.3	61.4
200	64.1	71.1
250	69.5	78.2
300	73.3	83.3
322	74.7	85.1
350	75.9	
400	77.0	
404.7	77.1	

input, swept 85.1 per cent of the same area. As the test area represents 442 acres, the arrangement used in test A would sweep 330 acres and that used in test B would sweep 376 acres with the same volume of gas. The increase in the affected area of test B over the affected area of test A would yield 46 acres times 1,190 barrels per acre or 54,740 barrels of oil.

The cited data indicate the importance of careful study in planning secondary-recovery projects in oil-producing sands at depths such that redrilling to a definite well pattern might be unprofitable. Before wells in such fields are plugged and abandoned their possible use in secondary-recovery operations should be considered.

Summary

The McDonald gas-injection project, which is one of the few secondary-recovery operations in southwestern Pennsylvania, is described briefly. The project includes 3,200 acres of the 13,000-acre McDonald field where the oil-producing sands are approximately 2,500 feet below the surface of the ground. The field was developed between the years 1892 and 1916 and in 1932 secondary-recovery operations were started by the injection of a mixture of 70 per cent natural gas and 30 per cent air through the first of 12 injection wells. Existing oil-producing wells were used in the project, and no new wells were drilled. The gas was injected through the annulus between the casing and tubing strings of most of the injection wells with the tubing and pumping equipment left in those wells for liquid removal if necessary.

Oil production for each of the 29 affected leases, by years, from 1892 to 1941 inclusive is presented in tabular form (table 2). Volumes of gas injected through each of the 12 injection wells, by years, for 1932-41 are given in table 3. Well-head injection pressures ranged from 65 to 100 p.s.i.g.

A smaller area containing the Wallace Heirs lease was chosen for detailed study because the location and concentration of injection wells provided gas drives that resulted in the recovery of 1,190 barrels of gained oil per acre or 108 barrels per acre-foot. Results of electrolytic model tests are presented to show the benefits that would accrue through the use of a greater number of injection wells and the elimination of well interference when arranging a secondary-recovery project in which only existing wells are to be used.

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The study was made under the supervision of R. A. Cattell, chief, Petroleum and Natural Gas Branch, and Sam S. Taylor, supervising engineer, Petroleum Field Office, Bureau of Mines, Franklin, Pa.

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APPENDIX

Selected Well Records

ABBREVIATIONS USED IN RECORDS

G	gas
O	oil
O-G	oil and gas
OS	oil show
GS	gas show
W	water
SW	salt water
O-W	oil and water
G-W	gas and water
IP	initial production
BPD	barrels per day
BPH	barrels per hour
MCF	thousand cubic feet
DF	derrick floor (elevation)
GR	ground (elevation)
E. G. C.	Equitable Gas Company
F. O. C.	Forest Oil Company
P. N. G.	Peoples Natural Gas Company
S. P. O. C.	South Penn Oil Company
W. O. C.	Woodland Oil Company

MAP NUMBER	1H – 9	1H – 18	1I – 1	1I – 22	1I – 26	1J – 15	1J – 21	1J – 27	1K – 4	2G – 9	2G – 21	2G – 30	2I 26	2I 38
NAME OF WELL	PJ Magnus Hrs 6	M McMillan Hrs 4	Gibson 1	O Gibson Hrs 3	A B Speer 2	Michael 1	Ewing 9	Oliver Leech	Bragdon	J M Moore 8	Jon(Sam) Phillips 4	Freda Heckle 1	M Clever 1	A P Clever 9
OWNER	S P O C	S P O C	Laughner & Wolly	S D Robison	S O Robison	S O Robison	S D Robison	E G C	J H Galey et al	S P O C	J H Galey et al	S P O C	E G C	F O C
ELEVATION			878			1055?	1035		720		–			
Pittsburgh coal													71 – 75	
Dunkard sand (Lr) (B)														
Freeport coal (U) (L)							465 – ?		110 – 115					
First Gas sand														
Salt sand (1 st) (2 nd)									420 – 425 460 – 490					
Maxton sand														
Big Lime														
Big Injun sand							1000 – ?	750 – 1020	620 – 900 BREAK 685 – 715		W – 1100		1155 – 1435	
Squaw sand									972 – 980				1530 – 1580	
Murrysville sand									1192 – 1232				1810 – 1840	
Hundred Foot sand	1690 – 1790	1610 – 1695	1528 – 1640 BREAK – 1545 – 1560 O – 1575 – 1595 I P 48 P D	1775 – 1884 O – 1803, 1820	1803 – 1920 O – 1841, 1850 W – O – 1846	1684 – ? O – 1724	1700 – 1812 O – 1730 – 1738	1595 – 1715	1327 – 1449 G – O – 1388 I P – 2 – 38 P D	1717 – 1817	1750 – 1848 G – O – 1769 W – 1771 I P – 108 P O	1760 – ? O S – 1768 – 1788	1890 – 2000	
Gantz sand														
Fifty Foot sand														
Upper Nineveh sand		1769 – 1809 G – 1781	1700 – 1734	1943 – ?			1852 – ?	1840 – ?	1507 – ?		1911 – 1945	1915 – ?		
Lower Nineveh sand					1978 – ?			? – 1890	? – 1558	1884 – 1930		? – 1950	2110 – 2130	
Gordon Stray sand		1829 – ?	1783 – 1813 G – 1788						1578 – 1613				2139 – ?	
Gordon sand	1938 – ? G – 1978	? – 1899 G – 1894	1841 – 1887	2034 – 2079	2071 – 2113		? – 1985	1952 – 1989	1619 – 1650 G – ?		2009 – 2050	2010 – 2040	? – 2195	2076 – 2128
Fourth sand	2000 – 2015 O – 2008	1925 – 1942	1925 – 1955	2100 – 2138 G – 2113, 2123	2137 – 2167	2002 – ? G – 2040	2020 – 2080 G – 2063 – 2073		1682 – 1722	2032 – 2066	2075 – 2090 O – 2081?	2100 – 2125 G – 2110	2230 – 2245	2166 – 2176
Fifth sand	2067 – 2072	1984 – 2015 O S – 1988 G – 1997		2165? – 2198 G – 2181	22002 – 2225		2108 – 2124 G – 2116	2064 – 2106	17717 – 1781 O S – ?	2081 – 2118	2131 – 2161 G – 2141	2145 – 2160	2285 – ?	2222 – ? O – 2253
Deepest sand drilled	Fifth	Fifth	Fourth	Fifth	Fifth	Fourth	Fifth	Fifth	Fifth	Fifth	Fifth	Fifth	Fifth	Fifth
TOTAL DEPTH	2080	2025	1975	2200	2257	2040?	2155	2115	1837	2124	2161?	2160?	2310	2253?
DATE COMPLETED		1903						1893	1887	1903	1907		1893	

MAP NUMBER	2 I-40	2 I-41	3 H-1	3 I-26	3 I-35	3 I-33	4 E-3	4 E-18	4 E-23	4 F-30	4 F-26	4 F-31	4 F-37	4 G-41
NAME OF WELL	D K Clever 9	A P Clever 12	S.B. Phillips 1	L. Fritsch 8	G Weltengale 1	P Partman 3	J.G Stonesipher 1	N Lorrain 2	J.C McNichael 4	Adams-Linlon Hrs 3	J.J McCurdy 10	J.J McCurdy 1	J.J McCurdy 11	J. Orris 1
OWNER	F O C	S. P. O. C.	W O C	F O C	S P O C	S P O C		S P O C	J.G.McNichael	S P O C	S P O C	S P O C	S P O C	E G G
ELEVATION	1113DF		1233?	1200GR		1139	1187	1111DF		1151GR		1078DF	1159GR	
Pittsburgh coal			86-90		25-32	50-?	60-65			50-56			72-80	
Dunkard sand (LI) (B)			683-702											
Freeport coal (U) (L)			702-703 764-771			720-725				725-728				632-640
First Gas sand														
Salt sand (1 st) (2 nd)			970-1025 1065-1117		930-950	942-? G-949 W-957 ?-1070	965-?		850-?	937-982			975-? ?-1130	
Maxton sand							?-1190		?-1060					
Big Lime														
Big Injun sand			1232-1428		?-1400	1159-1420	1200-1300		1090-1210	1299-1435			1238-1443	1101-1350
Squaw sand			1557-1599			1450-1480			?-1425					
Murrysville sand			1776-1790				1785-1815							
Hundred Foot sand	1800-1920			1926-? O-1971	1886-1996	1895-1990							1980-2057	
Gantz sand			1932-1959						1795-1802					1805-1840 W-1835
Fifty Foot sand			1970-2016 G-W -1983				1973-2018		1828-1876					1855-1908
Upper Nineveh sand						2032-2037								
Lower Nineveh sand		2000-2030	2095-2120 O S - 2111		2060-2075	2070-2094	2088-2114		1955-1972 G S - 1957	2053-2065	2166-2177		2100-2128	
Gordon Stray sand		2061-2089	2147-2155	2188-2203 O-2201-2203				2080-2102	2000-2025 G S.- 2019	2118-2120			2053-?	2032-?
Gordon sand	2050-2100	2095-2120	2163-2208 G-2167,2188-2193	2217-2240 O-2240	2128-2152	2120-2161 O-2151-2159 1P-5BPD	2180-2208	2107-2134	2045-2066	2145-2170			?-2220	?-2103
Fourth sand	2145-2178	2166-2176	2253-2275	2273-2278	2215-2236		2254-2269 O-2264	2177-2205	2103-2121				2255-2285	2129-2154
Fifth sand	2193-2238 O-2226	2214-2257	2315-2335 O-2334	2333-2350	2265-2300 O-2282,2300		2317-2332	2240-2273 O-2263	2168-2202 G-2154? O-2190 1P-5BPD	2278?-2305 O-2284?	2377-2382	2215-2223 O-2221	2310-2337 O-2326-2334 1P-2BPD	2192-2219
Deepest sand drilled	Fifth	Fifth	Fifth	Fifth	Fifth	Gordon	Fifth	Fifth	Fifth	Fifth	Fifth	Fifth	Fifth	Fifth
TOTAL DEPTH	2238?	2263	2342	2350?	2308	2175	2335	2373	2202	2305?	2362?	2223?	2339	2223
DATE COMPLETED			1894		1914	1930			1928	1919			1918	1912

MAP NUMBER	4 H – 3	5 B – 1	5 C – 24	5 D – 1	5 D – 18	5 D – 19	5 E – 15	5 E – 26	5 E – 34	5 E – 47	5 E – 52	5 G – 9	6 B – 2	6 C – 6
NAME OF WELL	J Nichol 2	J Morrow 3	Walker Hrs 4	J Lutz 1	Mathews-Ewing 2	Mathews-Ewing 3	L Shaffer 5	T Wright Hrs 2	J Stewart 3	J N Ewing 2	J N Ewing 7	J McMichael 1	J. Gormley 22	J Gormley 20
OWNER	S D Robison	S P O C	S P O C	S P O C	Jennings Bros Co	Jennings Bros Co	F O C	S P O C	S P O C	S P O C	S P O C	Fisher Oil Co	S P O C	S P O C
ELEVATION	1110			1107 DF	1038 DF				1094 DF		1127 D F			1160 GR
Pittsburgh coal									13 – 20		55 – 60			82 – 87
Dunkard sand (Lı) (B)														
Freeport coal (U) (L)			647 – 657		650 – 654	650 – ?			610 – 616 695 – 700		751 – 757	702 – ?	655 – ?	
First Gas sand								905 – ?		750 – ?				
Salt sand (1 st) (2 nd)		815 – 900	825 – 955						995 – ? ? – 1050			870 – ?	928 – 998	970 – 1070
Maxton sand						1025 – ?		? – 1155		? – 1020		? – 1118	1030 – 1070	
Big Lime														
Big Injun sand	985 – 1265	1040 – 1300	1065 – 1325		1112 – ?	1120 – ? W – 1135		1190 – 1440	1130 – 1370		1250 – 1550	1130 – ? G S – ?	1115 – 1380	1229 – 1455
Squaw sand	1325 – 1385				1450 – ?							? – 1500		1510 – 1550
Murrysville sand	1600 – ?				1685 – ?							1740 – 1800		
Hundred Foot sand	1740 – 1850					1826 – 1922 W – 1831	1820 – 1900	1855 – 1940	1877 – 1961	1808 – 1893	1930 – 2020	1876 – 1976		1966 – 1971
Gantz sand														
Fifty Foot sand		1841 – 1895	1834 – 1883		1853 – 1903								1902 – 1960	
Upper Nineveh sand														
Lower Nineveh sand	1910 – 1944	1985 – 1994	1955 – 1983		1990 – 2005	1995 – 2010					2095 – 2105	2036 – ?	2034 – 2056	2125 – 2148 G – 2129 – 2132
Gordon Stray sand	1969 – 1998 G – 1993	2041 – 2049	2005 – 2019 05 – GS – 2007 – 2018 1 P – 33 B P O		2050 – 2062	2060 – 2075			2084 – 2099		2140 – ?		2088 – 2096	2182 – 2194
Gordon sand	2006 – 2027	2066 – 2095			2075 – 2097	2080 – 2115	2078 – 2103	2105 – 2127	2119 – 2145	2073 – 2105	? – 2202	2100 – 2150 G – 2130 ?	2111 – 2140 0 S – 2113	2205 – 2233
Fourth sand	2062 – 2095		2125 – 2133			2155 – 2175			2178 – 2198		2238 – 2254	2180 – 2200		
Fifth sand	2129 – 2169 G – G – 2141 O – 2167 1 P 40 B P H	2196 – 2214	2163 – 2190	2262 – 2292 O – 2282	2199 – ? G – 2215 O – 2215 – 2221	2215 – 2240 05 – 2225 – 2233	2200 – 2220 O – 2202 – 2210 1 P – 1320 B P O	2232 – ? O – 2235	2248 – 2275 O – 2260 – 2275	2178 – 2199 O – 2183 1 P – 2768 B P O	2300 – 2323 O – 2310 – 2321	2257 – 2272 O – ?	2238 – 2248	2334 – 2355 O – 2340 – 2346 1 P 28 P O
Deepest sand drilled	Fifth	Fifth	Fifth	Fifth	Fifth	?	Fifth	Fifth	Fifth	Fifth	Fifth	Fifth	Fifth	Fifth
TOTAL DEPTH	2169 ?	2218	2193	2292?	2241	3615	2223	2247	2285	2202	2325	2278	2249	2360
DATE COMPLETED		1918	1918		1917	1918	1891			1892	1892	1891	1919	

MAP NUMBER	6C - 10	6C - 12	6C - 26	6C - 32	6C - 35	6C - 46	6C - 52	6D - 4	6D - 9	6E - 15	6E - 21	6E - 23	6E - 26	6E - 30
NAME OF WELL	J Whitmore 6	J Gormley 11	J Gormley 19	J J Mathews 7	J J Mathews 8	A Bell 2	J J Mathews 1	T Gamble 5	T Gamble 2	J Sturgeon 1	J Sturgeon 1	J Sturgeon 4	McClelland Hrs 1	S H Sturgeon 1
OWNER	S P O C	S P O C.	S P O C.	Jennings Bros Co	Jennings Bros Co	Jennings Bros Co	Jennings Bros Co	S P O C	S P O C		Young Bros		S P O C.	S P O C
ELEVATION	1033 GR					1052 D F	1074 D F	1092		1141 GR		1099 D F	1011 D F	
Pittsburgh coal				64 - 70	116 - 122							20 - 25		
Dunkard sand (L) (B)														
Freeport coal (U) (L)				730 - 735	780 - 785							692 - 697		
First Gas sand				835 - 865						? - 870				
Salt sand (1 st) (2 nd)				975 - ? ? - 1100	1026 - ? W - 1065 ? - 1145			875 - ?	760 - ?			924 - 950	760 - ?	905 - ?
Maxton sand					1175 - 1210			? - 1120	? - 1020	? - 1140			? - 1030	? - 1100
Big Lime					1250 - ?									
Big Injun sand				1180 - 1430	? - 1510 GS-1400			1140 - 1375	1035 - 1280	1150 - 1420		1140 - 1410	1040 - 1310	1105 - 1400
Squaw sand				1510 - 1530	1560 - 1580							1470 - 1525		
Murrysville sand														
Hundred Foot sand	1815 - 1898									1915 ? - 2005 ?	1898 - 1976		1755 - 1845	1820 - 1892
Gantz sand												1898 - 1912		
Fifty Foot sand		1968 - 2056	2067 - 2142	1944 - 2024 O - 1980 - 1989	1990 - 2070	1890 - 1935 O - W - 1910		1920 - 1972	1800 - 1860			1930 - 1965		
Upper Nineveh sand														
Lower Nineveh sand			2226 - 2233		2151 - 2171						2050 - 2075	2045 - 2060		
Gordon Stray sand	2059 - 2074 OS - ?	2168 - 2178	2285 - 2295	2150 - 2160 O - 2157	2197 - 2215						2110 - 2122	2115 - ?		
Gordon sand	2087 - 2112	2193 - 2218	2313 - 2340	2176 - 2199	2229 - 2247	2107 - 2137 O - 2121	2137 - 2165 O - 2149	2125 - 2153	1993 - 2013	2176 ? - 21982	2128 - 2165	? - 2165	2060 - 2082	2100 - 2130
Fourth sand				2264 - ?	2296 - 2304						2205 - 2229	2200 - 2216		
Fifth sand	2210 - 2240 O - 2224, 2234	2315 - 2351	2440 - 2468	2296 - 2332	2348 - 2384 O - 2350 - 2366 O - 2374 - 2382	2229 - 2254	? - 2282	2262 - 2289	2123 - 2153 O - 2133	2301 - 2320 O - 2311	2269 - 2294 O - 2282 I P - 18 P D	2266 - 2295	2185 - 2203 O - 2198 I P - 508 P M	2223 - 2248 O - 2231 - 2241 I P - 330 B P D
Deepest sand drilled	Fifth	Fifth	Fifth	Fifth	Fifth	Fifth	Fifth	Fifth	Fifth	Fifth	Fifth	Fifth	Fifth	Fifth
TOTAL DEPTH	2240 ?	2353	2472	2345	2395	2277	2299	2289 ?	2153 ?	2334	2302	2295 ?	2205	2255
DATE COMPLETED				1914	1917	1891	1891	1892	1891	1892	1939	1918	1892	1892

MAP NUMBER	6E – 34	7N – 4	7A – 6	7B – 5	7B – 8	7C – 7	7C – 18	7C – 20	7C – 22	7D – 47	8M – 2	8N – 4	BA – 20	BA – 52
NAME OF WELL	A Kemp 1	R Crooks 2	Elliott Bros 20	GW Baldwin 5	W G Herron 6	W G Herron 1	E Glenn 1	W G Herron 7	R W Glenn 5	H Sterling 3	R M Dickson	G Stitley 1	W S Robb 1	E McDonold 26
OWNER	S P O C	S P O C	S P O C	S P O C	Jennings Bros. Co	Jennings Bros Co	S P O C	Jennings Bros Co	F O C	S P O C	Bermid OBG Co	Amon–Koutman	W F Borchers	S P O C
ELEVATION				1169 O F			1083 O F							1099 O F
Pittsburgh coal	40 – ?	45 – 50								225 – ?		17–19		42 – ?
Dunkard sand (Li) (B)		394 – 420										404 – 424		
Freeport coal (U) (L)												680–682		
First Gas sand						770 – ?								
Salt sand (1 st) (2 nd)	960 – ?	928 – ? ? – 1040			885 – ?			800 – ?	990 – ?	1105 – ? W–1120 ? – 1285	830 – ? ? – 960	957 – ? ? – 1037		
Maxton sand	? – 1150				? – 1115	? – 1000 ?		? – 1035	? – 1080		980 – 1008			
Big Lime											1035 – 1070	1082 – 1120		
Big Injun sand	1156 – 1406	1140–1435 W–1214 G–1219 1 P – 365 M C F			1125 – 1395	1030 – 1320		1045–1315	1100 – 1223	1350 – 1545	1075–1400 W–1075	1120 – 1420		
Squaw sand		1522 – 1545									1461 – 1524	1495 – 1555 BREAK – 1515 – 1531 G – 1540 1 P – 33 M C F		
Murrysville sand		1810 – 1830				1700 – 1735					1710 – ?			
Hundred Foot sand	1850 – 1925				1940 – 2000			1827 – 1887	1850 – 1950					
Gantz sand		1943 – 1958				1800 – 1865								
Fifty Foot sand		1986 – 2018 Break – 2002 – 2004	2003 – 2050	2020 – ?		1867 – 1873	1965 – 2020			2100 – 2160	1894 – 1917	1925–1980 Break – 1940–1950		1960–1998
Upper Nineveh sand														
Lower Nineveh sand			2126 – 2134 G S – ?								2062 – 2080 G–2075			
Gordon Stray sand		2183 – 2186 G – 2186 1 P – 365 M C F		2188 – ? O – ?	G – 2138						2102 – 2105			
Gordon sand	2130 – 2160	2190 – 2217	2198 – 2218 G – ?	2223 – ?	2142 – 2162	2036–2056	2160 – 2190 O – 2173	2057 – 2086 O – ? 1 P – 45 B P O	2105–2128	2330 – 2361	2120 – 2125 G–2122	2150 – 2165	2109 – 2127	2174 – 2196
Fourth sand		2240 – 2246				2096 – 2111				2408 – 2429 G – 2412				
Fifth sand	2276 – 2294 O – 2284 1 P – 415 B P O	2300 – 2308	2315 – 2332 O–G–2315 – 2324	2344 – ?	2252 – 2268 O – 2263 – 2266	2158 – 2186	2282 – 2290 O–2284 1 P – 1680 B P O			2472 – 2495 G – 2475 O – 2480 1 P – 115 B P O		2277 – 2290	2231–2240	2295–2312
Deepest sand drilled	Fifth	Fifth	Fifth	Fifth	Fifth	Fifth	Fifth	Gordon	Gordon	Fifth	Gordon	Fifth	Fifth	Fifth
TOTAL DEPTH	2294 ?	2340	2332 ?	2375	2273	2203	2290 ?	2087	2128 ?	2495 ?	2125 ?	2290 ?	2257	2316
DATE COMPLETED	1891	1941			1892		1891	1892		1893			1891	

MAP NUMBER	8 B – 6	8 B – 9	8 C – 33	8 C – 41	8 C – 51	8 D – 10	8 D – 16	8 E – 1	9 L – 4	9 L – 6	9 O – 46	9 O – 71	9 A – 57	9 B – 37
NAME OF WELL	J McO Glenn 2	J Mevey 17	Robb Heirs 8	N W Campbell 3	Wallace Heirs 8	R Wallace 1	K Shane 1	T-J E Morrow 1	W Lotfart 1	Plummer Leipold 5	K N McDonald 17	J M Stilley 4	J R Gladden 7	Mr Ewen 1
OWNER	S P O C	S P O C	S P O C	S P O C	S P O C	S P O C	S P O C	S P O C	Morris & Co	Charliers Oil Co	S P O C	S P O C	S P O C	Steele & Co
ELEVATION	1070			1190 0 F			1156 D F	1242 D F	1172 G R		1241 D F			1154 D F
Pittsburgh coal				230 – ?	162 – ?	135 – ?	120 – ?		153 – 160	150 – ?	210 – ?	278 – ?	265 – ?	155 – ?
Dunkard sand (Li) (B)									678 – 782					
Freeport coal (U) (L)									782 – 786					810 – 816
First Gas sand														
Salt sand (1 st) (2 nd)	900 – ?					1020 – ? G-1030 SW 1040 ? – 1160	1040 – ? SW – 1055		1098 – 1187				1220 – ? SW 1225	1000 – ?
Maxton sand	? – 1115													
Big Lime									1205 – 1245					1250 - 1265 ?
Big Injun sand	1160 – 1410			1310 – 1560		1260 – 1510	1260 – 1525		1245 – 1543	1230 – 1510			1390 – 1690	1260 ? – 1495
Squaw sand									1562 – 1575					1615 – 1640
Murrysville sand										1880 – ?			1575 – ?	
Hundred Foot sand	1868 – 1943					1995 – 2085								
Gantz sand										2025 – ?			2150 – ?	
Fifty Foot sand			2102 – 2146		2057 – 2095				2069 – 2094	2060 - 2084 G S – ?			2180 – 2225	2065 – 2100
Upper Nineveh sand														
Lower Nineveh sand														
Gordon Stray sand			2282 – 2300										2375 - 2385	2224 – 2239
Gordon sand	2138 - 2160 O - 2144, 2148 I P - 308 P D	2242 - 2262 O – ?	2305 - 2325 O – ?	2347 – 2367 I P - 114 B P D	2294 - 2315 O - 2302 I P 308 P D	2251 - 2271	2251 - 2280 O 2260 - 2275 I P - 538 P D		2243 – 2254	2262 – ? G S – 2 0 - ?	2338 - 2369 O - 2338	2405 – 2439	2400 - 2422 O - 2402 I P - 248 P D	2253 - 2283 O - G - 2263 - 2279
Fourth sand					2356 - 2364	2307 - 2322 G S – ?		2415 - 2430 G - 2416		2312 - 2327				2322 – 2347
Fifth sand	2272 - 2290	2360 - 2378 O – ?	2436 - 2454 O S - 2446		2415 - 2435	2372 - 2392		2478 - 2493 O - 2484 - 2487		2362 – 2397	2463 - 2468	2533 – 2550	2522 – 2539	2393 - 2413 O S - 2396, 2408
Deepest sand drilled	Fifth	Fifth	Fifth	Gordon	Fifth	Fifth	Gordon	Fifth	Fifth	Bayard	Fifth	Fifth	Fifth	Fifth
TOTAL DEPTH	2290 ?	2378 ?	2454 ?	2367 ?	2435	2412	2280 ?	2487 ?	2450	2488 ?	2489	2553	2541	2413 ?
DATE COMPLETED			1904		1924	1892			1939	1894			1893	1933

MAP NUMBER	9 B - 55	9 C - 4	9 C - 9	9 C - 27	9 C - 32	9 D - 12	9 E - 10	10 L - 1	10 N - 8	10 O - 10	10 O - 20	10 O - 23	10 A - 39	10 B - 35
NAME OF WELL	N G Cook 2	Wallace Heirs 11	A Shane 8	W A Dickson 12	R D Potter 5	N G Cook 7	J Campbell 2	H G Roob 1	J G Berry 4	J M Stilley 1	M Crawford 2	J Scott Heirs 5	J P Scott 1	J P Scott 12
OWNER	Steele & Co	S P O C	S P O C	S P O C	S P O C	S P O C	S P O C	Giffin & Co	S P O C	S P O C		S P O C	F O C	F O C
ELEVATION	1114 D F	1258 DF				1060 GR			1208GR		1259 D F	1269 GR		
Pittsburgh coal	123 - ?	240 - ?			84 - ?	42 - 50	128 - ?	240 - ?	268 - ?	208 - 214	300 - 308	295 - ?	223 - 231	360 - 367
Dunkard sand (Li) (B)								735 - 739						
Freeport coal (U) (L)	730 - ? 790 - ?													
First Gas sand	975 - ? G - 1002													
Salt sand (1st) (2nd)	1024 - ? W - ? ? - 1137					850 - ? W - 980 ? - 1092		1177 - 1238			1170 - ? ? - 1326		1141 - ? ? - 1236	
Maxton sand						1092 - 1100								
Big Lime	1210 - 1253							1285 - 1320					1298 - 1338	
Big Injun sand	1253 - 1485		1265 - 1585			1188 - 1445		1320 - ?		1320 - 1580	1440 - 1690		1338 - 1600	
Squaw sand	1585 - 1605					1535 - 1575		? - 1665						
Murrysville sand	1815 - 1885													
Hundred Foot sand														
Gantz sand			2000 - 2045											
Fifty Foot sand	2038 - 2080	2155 - 2198		2094 - 2114 G - 2096		1951 - 1995		2144 - ?		2120 - 2164			2125 - 2145	
Upper Nineveh sand								2226 - 2236						
Lower Nineveh sand	2165 - 2170													
Gordon Stray sand	2205 - 2216			2285 - 2295	2197 - 2213 O - 2200 I P - 58 P D	2125 - ?	2190 - 2225			2290 - ?	2410 - ?			
Gordon sand	2221 - 2257 O - 2227 - 2235, 2247 - 2253	2356 - 2388 G - 2356 O - 2363 I P - 208 P D.	2263 - 2307	2305 - 2348 G.S - ?	2217 - 2242 S W - 2222	? - 2197	2230 - 2254	2326 - ?		2325 - 2355 O - 2345	2419 - 2437 O - 2423	2421 - 2450	2316 - 2351	2430 - 2450
Fourth sand				2382 - ?	2278 - 2288	2229 - 2255	2292 - 2305						2385 - 2401 O - 2390	2487 - 2504 O - 2497
Fifth sand				2444 - 2466 O - 2446	2337 - 2359	2300 - 2320 G - 2306 - 2311	2352 - 2374 O - 2362		2500 - 2521	2454 - 2476	2536 - 2557 O - 2540	2541 - 2566		
Deepest sand drilled	Gordon	Gordon	Gordon	Fifth	Fifth	Fifth	Fifth	Gordon	Fifth	Fifth	Fifth	Fifth	Fourth	Fourth
TOTAL DEPTH	2273	2397	2317	24667	23667	2341	2377	2351	2532	24767	25577	25687	24017	25047
DATE COMPLETED	1930					1945		1925		1893				

MAP NUMBER	10 C - 4	10 C - 10	10 O - 3	11 O - 8	11 O - 11	11 O - 13	11 A - 4	11 A - 11	11 A - 17	11 A - 33	11 A - 58	11 A - 59	11 A - 66	11 A - 67
NAME OF WELL	N G Cook 1	Shane Bros 1	J E. Clark 2	Berry Heirs 2	George Heirs 4	A M Scott 6	J A Little 23	J P Scott 22	E Barnes 1	Burgon - Sterling (Fisher) - 2	Burgon - Sterling (Gallagher) - 2	Burgon - Sterling (Gallagher) - 39	Burgon - Sterling (Gallagher) - 1	Burgon - Sterling (Borcher) - 1
OWNER	Steele & Co	S P O C	S P O C	S P O C	S P O C	S P O C	S P O C	S P O C	S P O C	S P O C	S P O C	S P O C	S P O C	S P O C
ELEVATION		1207 GR		1140 DF		1209 DF		1158 DF		1185 D F	1152 DF			
Pittsburgh coal	112 - ?		210 - ?		268 - ?	275 - ?		195 - 205	115 - 122	247 - 252	228 - 235		170 - 178	150 - 156
Dunkard sand (U) (L) (B)	745 - ?													
Freeport coal (U) (L)	765 - ?							775 - ?		825 - 830				
First Gas sand														
Salt sand (1 st) (2 nd)	1000 - ?							1120 - ? G-1125 W-1128 ?-1195		1180 - 1260	1175 - 1265		1090 - ? W - 1110 ? - 1190	
Maxton sand	? - 1190													
Big Lime	1200 - ?													
Big Injun sand	1220 - ?							1342 - 1555	1212 - 1490	1340 - 1600	1338 - 1570		1275 - 1520	1300 - 1500
Squaw sand	1525 - 1550					1765 - 1781				1670 - 1719				
Murrysville sand						2036 - 2066								
Hundred Foot sand														
Gantz sand														
Fifty Foot sand	2035 - 2070				2145 - 2190	2175 - 2215	2090 - 2138	2085 - 2133 G - 2090	2015 - 2055	2147 - 2197	2104 - 2154 G - 2110	2116 - 2163 G S - ?	2040 - 2080 G - 2050	2035 - 2075
Upper Nineveh sand														
Lower Nineveh sand	2130 - 2135 G S - ?							2203 - 2223	2145 - 2155		2215 - 2223		2175 - 2180	2170 - 2180
Gordon Stray sand	2180 - 2195 G - 2185	2309 - 2323 G - 0 - 2312		2292 - ? O S.			2260 - 2290	2273 - 2291	2180 - 2190	2318 - 2333	2280 - 2295	2282 - 2292	2215 - 2230	2220 - 2235
Gordon sand	2202 - ? G - 2222 O - 2222 - 2227	? - 2359 O - 2335	2330 - 2345	? - 2337	2355 - 2375 O - G - 2349	2387 - 2411	2299 - 2330	2303 - 2338 W - 2313	2210 - 2240 W - 2230	2339 - 2380 W - 2364	2305 - 2340 W - 2320	2300 - 2345	2240 - 2275 W - ?	2245 - 2280
Fourth sand		? - 2410	2371 - 2387		2430 - 2435	2446 - 2452	2355 - 2374	2363 - 2384 O - 2368 I P - 21 d P O	2276 - 2295 O - 2286 - 2294	2406 - 2426 O - 2409 - 2417 I P - 60 B P O	2375 - 2393 O - 2378 - 2390	2372 - 2391 O - ?	2319 - 2339 O - 2325 - 2335	2305 - 2325 O - 2308 2325
Fifth sand		2450 - 2471 G - 2465	2434 - 2450	2428 - 2475	2485 - 2495 O - 2489	2497 - 2514 O - ?						2441 - 2455		
Deepest sand drilled	Gordon	Fifth	Fifth	Fifth	Fifth	Fifth	Fourth	Fourth	Fourth	Fourth	Fourth	Fifth	Fourth	Fourth
TOTAL DEPTH	2238	2471?	2460	2475?	2519	2520	2374?	2387	2301	2426?	2393?	2457	2348	2329
DATE COMPLETED		1893	1896			1899	1916		1913	1918	1913	1913	1913	1913

MAP NUMBER	11 A - 73	11 A - 100	11 A - 101	11 B - 27	11 B - 31	11 C - 15	12 O - 2	12 A - 2	12 A - 7	12 A - 21	12 B - 18	12 B - 28		
NAME OF WELL	Burgan - Sterling (Carnpatch) - 1	Harper Heirs 10	J B May 1	J W Giffin 3	J W Giffin 12	J S Cowden 2	A J Moore 7	Harper Heirs 7	J G Moore 16	J. Patterson 2	G M Caldwell 3	G N Glass 1		
OWNER	S P O C	S P O C	S P O C	S P O C	S P O C	S P O C	S P O C	S P O C	S. P O C	S P O C	S P O C	S. P O C		
ELEVATION			1183 D F	1151 D F	10900 F	989 D F	1265 GR		1252	1287 O F		1145 GR		
Pittsburgh coal	140 - 147	170 - ?	272 - 280	233 - 238			329 - 336	178 - ?		375 - ?	320 - ?	315 - ?		
Dunkard sand (Li) (B)							870 - 895							
Freeport coal (U) (L)	835 - ?													
First Gas sand		1011 - 1041					1075 - 1132							
Salt sand (1 st) (2 nd)	990 - 1125 W - 1115						1245 - ? W - 1302 ? - 1350							
Maxton sand							1404 - 1418							
Big Lime	1280 - 1286						1424 - 1436							
Big Injun sand	1286 - 1505	1316 - 1520					1436 - 1645							
Squaw sand							1730 - 1753							
Murrysville sand	1880 - 1925	1906 - 1921					2010 - 2027							
Hundred Foot sand														
Gantz sand						1965 - 1990 G - 1975								
Fifty Foot sand	2045 - 2085 G - 2055	2060 - 2100	2155 - 2188 O - 2160	2138 - 2183	2052 - 2096	2000 - 2040 O - 2004?	2183 - 2240 G - 2199	2088 - 2138	2218 - 2249 O - 2232 - 2242 I P - 108 P O		2215 - 2255 O - 2227			
Upper Nineveh sand					2165 - 2189									
Lower Nineveh sand	2160 - 2175						2295 - 2315							
Gordon Stray sand	2205 - ? W - 2220	2224 - 2239 O - 2234					2356 - 2366		2385 - 2399					
Gordon sand	? - 2270	2242 - 2284 W - 2252	2358 - 2378	2336 - 2306 SW - 2351	2254 - 2289		2375 - 2385	2240 - 2263	2405 - 2441	2430 - 2455				
Fourth sand	2292 - ? O - 2296	2324 - 2340 O - 2329 - 2340 I P - 228 P O	2416 - 2428	2398 - 2409 O - ?	2324 - 2336 O - 2329 G S - ? I P - 128 P O	2267 - 2284 O - 2270 I P - 208 P D	2441 - 2458	2328 - 2344	2475 - 2489	2505 - 2525 O - 2510 I P - 148 P O	2478 - 2494 G - 2482	2463 - 2480 O - 2470		
Fifth sand							2504 - 2522 G - 2510 - 2525 I P - 78,300 C F		2540 - 2555		2540 - 2552	2525 - 2538		
Deepest sand drilled	Fourth	Fourth	Fourth	Fourth	Fourth	Fourth	Fifth	Fourth	Fifth	Fourth	Fifth	Fifth		
TOTAL DEPTH	2310	23402	24282	2411	2338	2284 P	2555	2352	2559	25252	2575	2545		
DATE COMPLETED		1914			1913	1894	1944	1895			1896	1893		

INDEX OF WELLS

In order to identify the various wells drilled in this area, a map (pl. 1) and two lists of wells have been prepared. The map has been divided into one-minute rectangles, the east-west tiers being lettered from K to O in the Burgettstown quadrangle, and A to K in the Carnegie quadrangle; the north-south tiers are numbered from 1 to 14. In the individual rectangles each well has been assigned an arbitrary number (not to be confused with the actual company-farm number). This map grid is the basis for the two index lists of wells below. One index lists wells aphabetically by farm name; the second index lists wells by one-minute rectangles. An example illustrating the use of each index follows: It is desired to find the location of J. J. Mathews No. 1. Using the first (alphabetical) index, this well is listed as Car 6C52 (Car=*Carnegie quadrangle;* Bur=*Burgettstown quadrangle*). Referring to Plate 1, grid 6C is located by the intersection of tier 6 and tier C; within grid 6C, well numbered 52 is found. This is J. J. Mathews No. 1. Conversely, if the name of a particular well on Plate 1 is desired, for instance well 10B1, the second list is consulted indicating the well to be M. Moorhead No. 1. The second list is arranged by rectangles reading from left to right (west to east) starting at the extreme northwest grid on Plate 1. In this list the quadrangle designation (Car or Bur) has not been used as there is no duplication of grids between the two quadrangles.

INDEX OF WELLS BY FARM NAME

A

Ackleson, W. J. & J. W.	2	Car 3I25
Ackleson, W. J. & J. W.		Car 3I37
Adams, John J.	1	Car 4G21
Adams, John J.	2	Car 4G28
Adams, John J.	3	Car 4G22
Adams, John J.		Car 4G24
Adams-Linton Heirs	1	Car 4F12
Adams-Linton Heirs	2	Car 4F29
Adams-Linton Heirs	3	Car 4F30
Ahlborn, S.		Car 4C1
Ahlborn, S.		Car 4C2
Aiken, Albert	1	Car 3H23
Aiken, Albert	2	Car 3H24
Aiken, Albert		Car 3H25
Aiken, James		Car 2I3
Aiken, James		Car 3H13
Aiken, James		Car 3H17
Aiken, James		Car 3H18
Aiken, John		Car 3G9
Aiken, John		Car 3G10
Aiken Heirs, William	1	Car 3I40
Aiken Heirs, William	2	Car 3I33
Aiken Heirs, William	3	Car 3H26
Aiken Heirs, William	4	Car 3I28
Aiken Heirs, William	5	Car 3H6
Aiken Heirs, William	6	Car 3I17
Aiken Heirs, William		Car 3H14
Aiken Heirs, William		Car 3H27
Aiken Heirs, William		Car 3I8
Aiken Heirs, William		Car 3I21
Anderson, A. R.		Car 11B55
Anderson, Rev. A. R.	1	Car 11B53
Anderson	1	Car 9D32
Anderson	3	Car 9D29
Andrews, S. L.	2	Car 3G11
Andrews, S. L.	3	Car 3G8
Andrews, S. L.	4	Car 3H20
Andrews, S. L.	5	Car 3H19
Andrews, S. L.		Car 3G7
Arbuckle, John		Car 2I7
Arbuckle, John		Car 2I8
Arbuckle, John		Car 2I10
Arbuckle, John		Car 2J13
Arbuckle, John		Car 2J14
Arbuckle, John		Car 2J15
Arbuckle, John		Car 2J18
Arbuckle, John		Car 2J20
Arbuckle, John		Car 2J21
Arbuckle, John		Car 3J2
Arbuckle, John		Car 3J3
Arbuckle, John		Car 3J4
Arbuckle, John		Car 3J5
Arbuckle, John		Car 3J6
Armstrong, William		Car 2I4

B

Badger Estate		Car 3J8
Bailey, E.		Car 6D11
Bailey, E.		Car 6D12
Bailey, E.		Car 6D18
Baldwin, George W.	1	Car 7B2
Baldwin, George W.	2	Car 7B7
Baldwin, George W.	3	Car 6B19
Baldwin, George W.	5	Car 7B5
Baldwin, George W.		Car 6B18
Barnes, Ella	1	Car 11A17
Barnes, Ella		Car 11A23
Barnett, S. J.		Car 12A27
Barnett, S. J.		Car 12A29
Barnett, S. J.		Car 12A30
Barnett, S. J.		Car 12A31
Barnett, S. J.		Car 13A1
Barnett, S. J.		Car 13A3
Beacon, F.	1	Car 2H4
Bean Plan		Car 6D19
Bell, Abram	1	Car 6C57
Bell, Abram	2	Car 6C46
Bell, Abram	3	Car 6C53
Bell, Abram	4	Car 6C42
Bell, Abram	5	Car 6C47
Bell, Abram	6	Car 6C40
Bell, Abram	7	Car 6C13
Bell, Abram	8	Car 6C23
Bell, Abram	9	Car 6C41
Bell, Abram	10	Car 6C27
Bell, Abram	11	Car 6C31
Bell, J. W.		Car 3G12
Bell, J. W.		Car 3G15
Bell, J. W.		Car 3G16
Bell, J. W.		Car 3G17
Bell, J. W.		Car 3G19
Bell, J. W.		Car 3G20
Bell, J. W.		Car 3G22
Bell, J. W.		Car 3G23
Bell, J. W.		Car 3G24
Bell, J. W.		Car 3G26
Bell, Nancy	1?	Car 5C26
Bell, Rev.		Car 12B33
Bell, Rev.		Car 12B34
Bernett, John		Car 3G6
Berry, J. G.	1	Bur 10N10
Berry, J. G.	2	Bur 10 O 25
Berry, J. G.	2	Bur 10 O 27
Berry, J. G.	3	Bur 10N5
Berry, J. G.	4	Bur 10N8
Berry, J. G.	5	Bur 10 O 33
Berry Heirs	1	Bur 11 O 3
Berry Heirs	2	Bur 11 O 8
Berry Heirs	3	Bur 11 O 15
Berry Heirs	6	Bur 10N11
Berry Heirs	7	Bur 11N5
Berry Heirs	8	Bur 10N12
Berry Heirs	9	Bur 11N3
Berry Heirs	10	Bur 11N7
Berry Heirs	11	Bur 11N9
Berry Heirs	12	Bur 10N13
Berry Heirs		Bur 10N14
Berry Heirs		Bur 11 O 16
Berry Heirs		Bur 11 O 19
Berry Heirs		Bur 11 O 20
Black, J. A.	2	Car 6D16
Black, J. A.	3	Car 6D13
Bohey, B.		Bur 9M6
Bohey, B.		Bur 9N19
Bohey, B.		Bur 9N26
Bohey, B.		Bur 9N30
Bohey, B.		Bur 9N36
Borchett, Dr.		Car 4H2
Borchett, Dr.	4	Car 4H4
Borland, A. J.		Car 11C8
Boyle		Car 4E6
Boys Industrial Home		Car 7E7
Brady	1	Car 9A1
Bragdon		Car 1K4
Brimm, F.		Car 4H7
Brown, James		Bur 11N11
Brown, Martha	1	Car 4D6
Brown, M. B.		Car 12N2
Brown, R. C.	2?	Car 9B39
Brown, R. C.	1? or 2?	Car 9B44
Burgan-Sterling	4	Car 11A45
Burgan-Sterling		Car 11A44
Burgan-Sterling (Borcher)	13	Car 11A67
Burgan-Sterling (Byerly)		Car 11B43
Burgan-Sterling (Byerly)		Car 11B45

Burgan-Sterling (Cornpatch)	1?	Car 11A73
Burgan-Sterling (Cornpatch)		Car 11A80
Burgan-Sterling (Cornpatch)		Car 11A81
Burgan-Sterling (Cornpatch)		Car 11A82
Burgan-Sterling (Fisher)	1	Car 11A47
Burgan-Sterling (Fisher)	2	Car 11A33
Burgan-Sterling (Fisher)	7	Car 11A50
Burgan-Sterling (Fisher)	8	Car 11A46
Burgan-Sterling (Fisher)	9	Car 11A55
Burgan-Sterling (Fisher)	10	Car 11A41
Burgan-Sterling (Fisher)	11	Car 11A32
Burgan-Sterling (Fisher)	12	Car 11A75
Burgan-Sterling (Fisher)	28	Car 11A61
Burgan-Sterling (Fisher)	29	Car 11A71
Burgan-Sterling (Fisher)	30	Car 11A60
Burgan-Sterling (Fisher)	31	Car 11A52
Burgan-Sterling (Fisher)	32	Car 11A53
Burgan-Sterling (Fisher)	36	Car 11A65
Burgan-Sterling (Fisher)	41	Car 11A54
Burgan-Sterling (Fisher)	44	Car 11A85
Burgan-Sterling (Fisher)		Car 11A84
Burgan-Sterling (Florence)	15	Car 11A57
Burgan-Sterling (Florence)	16	Car 11A64
Burgan-Sterling (Florence)	42	Car 11A79
Burgan-Sterling (Gallagher)	1	Car 11A66
Burgan-Sterling (Gallagher)	2	Car 11A58
Burgan-Sterling (Gallagher)	23	Car 11A56
Burgan-Sterling (Gallagher)	24	Car 11A72
Burgan-Sterling (Gallagher)	25	Car 11A63
Burgan-Sterling (Gallagher)	27	Car 11A68
Burgan-Sterling (Gallagher)	38	Car 11A62
Burgan-Sterling (Gallagher)	39	Car 11A59
Burgan-Sterling (Gruver)	33	Car 11A43
Burgan-Sterling (Gruver)	34	Car 11A27
Burgan-Sterling (Gruver)	35	Car 11A35
Burgan-Sterling (Gruver)	46	Car 11A28
Burgan-Sterling (Gruver)		Car 11A42
Burgan-Sterling (Orchard)		Car 11A69
Burgan-Sterling (Philadelphia)	1	Car 11A91
Burgan-Sterling (Philadelphia)	1 or 2	Car 11B22
Burgan-Sterling (Philadelphia)	2	Car 11A88
Burgan-Sterling (Philadelphia)	2 or 5	Car 11B30
Burgan-Sterling (Philadelphia)	3	Car 11B39
Burgan-Sterling (Philadelphia)	3	Car 11A90
Burgan-Sterling (Philadelphia)	4	Car 11A76
Burgan-Sterling (Philadelphia)	5	Car 11A86
Burgan-Sterling (Philadelphia)	6	Car 11A87
Burgan-Sterling (Philadelphia)	37	Car 11A78
Burgan-Sterling (Philadelphia)	40	Car 11A77
Burgan-Sterling (Philadelphia)		Car 11B20
Burgan-Sterling (Philadelphia)		Car 11B24
Burgan-Sterling (Philadelphia)		Car 11B40
Burgan-Sterling (Stableyard)	17	Car 11A70
Burgan-Sterling (Wheeling)	18	Car 11A31
Burgan-Sterling (Wheeling)	19	Car 11A25
Burgan-Sterling (Wheeling)	20	Car 11A40
Burgan-Sterling (Wheeling)	21	Car 11A39
Burgan-Sterling (Wheeling)	22	Car 11A51
Burgan-Sterling (Wheeling)	45	Car 11A49
Burrows, W. W.	1	Car 4F25
Burrows, W. W.	2	Car 4F42
Burrows, W. W.	3	Car 4F36
Burrows, W. W.	4	Car 4F34
Butterworth		Bur 9N44
Butterworth		Bur 9N51

C

Cagan, Mrs.		Bur 9N27
Cain, Adella		Bur 9K1
Caldwell, G. M.	1	Car 12B20
Caldwell, G. M.	2	Car 12B13
Caldwell, G. M.	3	Car 12B18
Caldwell, G. M.	4	Car 12B19
Caldwell, W.		Car 12B38
Caldwell, W.		Car 13B1
Caldwell, W.		Car 13B3
Campbell, James	1	Car 9D13
Campbell, James	2	Car 9E10
Campbell, James	3	Car 9E22
Campbell, James	4	Car 9E13
Campbell, James		Car 9D7
Campbell, James		Car 9D11
Campbell, James		Car 9E11
Campbell, James		Car 9E12
Campbell, James		Car 9E15
Campbell, James		Car 9E21
Campbell, James		Car 9E24
Campbell, James		Car 9E25
Campbell, James		Car 9E26
Campbell, Joseph	1	Car 9D14
Campbell, M.	1	Car 7D41
Campbell, M.	2	Car 7D45
Campbell, M.	3	Car 7D46
Campbell, M. W.	1?	Car 8D8
Campbell, M. W.	2	Car 8C41
Campbell, M. W.	3	Car 8C50
Campbell, M. W.	4	Car 8C53
Campbell, M. W.	5	Car 8D7
Campbell, M. W.	7	Car 8C49
Campbell, M. W.		Car 8C34
Campbell, M. W.		Car 8C57
Campbell, S. J.		Car 9E14
Campbell, S. J.		Car 9E18
Campbell, Scott	1	Car 5E29
Campbell, Scott		Car 5D2
Campbell, Scott		Car 5D7
Campbell, Scott		Car 5D10
Campbell, Scott		Car 5E22
Campbell, W. C.	1	Bur 9M23
Campbell, W. C.	2	Bur 9M30
Campbell, W. C.		Bur 9M16
Campbell, W. C.		Bur 9M20
Campbell, W. C.		Bur 9M22
Campbell, W. J.	3	Car 5E31
Campbell, W. J.		Car 5E30
Campbell, W. J.		Car 5E35
Campbell, W. J.		Car 5E38
Campbell (Miller, J. R.)		Car 11B47
Carl, O.		Bur 10L2
Carl, O.		Bur 10L3
Carl, O.		Bur 10L8
Carlisle, Robert	1?	Car 12B3
Carlisle, Robert	2	Car 11B64
Carlisle, Robert		Car 12B1
Cemetery Lot	1	Car 12A22

Choeloer, John		Car 3H8
Choeloer, John		Car 3H12
Ciaffoni, Paul	1?	Car 12B25
Clark, J. D.	2	Car 5D15
Clark, J. D. (Smith Co.)		Car 5C28
Clark, J. D.		Car 5D11
Clark, J. D.		Car 5D12
Clark, J. D.		Car 5D17
Clark, J. E.	1	Car 10D1
Clark, J. E.	2	Car 10D3
Clark, James	1	Car 6C3
Clark, James	1	Car 11A18
Clark, James	2	Car 11A20
Clark, James	3	Car 11A19
Clark, William H.		Car 5C3
Clever, A. P.	1	Car 3I5
Clever, A. P.	2	Car 3I10
Clever, A. P.	4	Car 3I1
Clever, A. P.	5	Car 3I6
Clever, A. P.	6	Car 2I34
Clever, A. P.	7	Car 2I33
Clever, A. P.	8	Car 2I35
Clever, A. P.	9?	Car 2I38
Clever, A. P.	9?	Car 2I39
Clever, A. P.	10	Car 2I30
Clever, A. P.	12	Car 2I41
Clever, A. P.		Car 2I36
Clever, A. P.		Car 2I37
Clever, A. P.		Car 2I44
Clever, A. P.		Car 2J19
Clever, A. P.		Car 3H7
Clever, A. P.		Car 3I13
Clever, A. P.?		Car 3J1
Clever, D. K.	1	Car 3I14
Clever, D. K.	2	Car 3I16
Clever, D. K.	4	Car 3I9
Clever, D. K.	5	Car 3I12
Clever, D. K.	1	Car 2I31
Clever, D. K.	7	Car 2I24
Clever, D. K.	8	Car 2I43
Clever, D. K.	9	Car 2I40
Clever, D. K.	10	Car 2I42
Clever, D. K.	11	Car 3I4
Clever, D. K.	12	Car 3I2
Clever, D. K.		Car 2I21
Clever, D. K.		Car 2I27
Clever, D. K.		Car 2J16
Clever, D. K.		Car 3I3
Clever, Martin	1	Car 2I26
Clever, Martin	2	Car 2I28
Clever, Martin		Car 2H22
Clever, Martin		Car 2I9
Clever, Martin		Car 2I11
Clever, Martin		Car 2I12
Clever, Martin		Car 2I13
Clever, Martin		Car 2I18
Clever, Martin		Car 2I20
Clever, Martin		Car 2I22
Clever, Martin		Car 2I23
Clever, Martin		Car 2I25
Clever, Martin		Car 2I29
Clever, Martin		Car 2I32
Clever, Martin		Car 3H2
Clever, Martin		Car 3H4
Clever, Martin		Car 3H5
Clever, Martin		Car 3H9
Clever, Martin		Car 3H10
Clever, Martin		Car 2I14
Cockins, John L.	1	Bur 11N2
Cockins, John L.	1	Bur 11N4
Cockins, John L.	2	Bur 11N1
Cole, A. P.		Bur 1J7
Cole, A. P.?		Car 1J8
Cole, A. P.?		Car 1J10
Connell, Robert I.	5	Car 7C11
Connell, Robert I.	7 or 1?	Car 7C5
Connell, Robert I.		Car 7D6
Connell Heirs (Hogan)		Car 6C58
Connor, Samuel	1	Car 11C5
Connor, Samuel	2	Car 11C4
Connor, Samuel	3	Car 11C9
Connor, Samuel	4	Car 11B11
Connor, Samuel	5	Car 11B10
Connor, Samuel	6	Car 11B18
Connor, Samuel	7	Car 11B12
Cook, N. G.	1	Car 9B50
Cook, N. G. (Steele & Co.)	1	Car 10C4
Cook, N. G.	2	Car 9B38
Cook, N. G. (Steele & Co.)	2	Car 9B55
Cook, N. G.	3	Car 9B48
Cook, N. G.	3	Car 9D23
Cook, N. G.	4	Car 9C37
Cook, N. G.	5	Car 9B51
Cook, N. G.	5	Car 9C21
Cook, N. G.	5	Car 9D17
Cook, N. G.	6	Car 9C25
Cook, N. G.	6	Car 9C38
Cook, N. G.	7(1)	Car 9B54
Cook, N. G.	7	Car 9D12
Cook, N. G.	8(2)	Car 10C8
Cook, N. G.	9(3)	Car 10B4
Cook, N. G.	10(4)	Car 10C9
Cook, N. G.	11(5)	Car 9C46
Cook, N. G.	12(6)	Car 9C44
Cook, N. G.	13(7)	Car 9C45
Cook, N. G.		Car 9D8
Cook, N. G.		Car 9D16
Cook, N. G.		Car 9D18
Cook, N. G.		Car 9D22
Cook, S. H.	1	Car 8A63
Cowan, J.		Car 5F7
Cowan, J.		Car 5F9
Cowan, J.		Car 5F16
Cowan, J.	4	Car 5G1
Cowan, J.		Car 5G3
Cowan, J.		Car 5G4
Cowden, A. T.	1	Bur 10N9
Cowden, A. T.	2	Bur 10N7
Cowden, A. T.	3	Bur 10N4
Cowden, J. S.	1	Car 11C17
Cowden, J. S.	2	Car 11C15
Cowden, J. S.	3	Car 11C16
Cowden, Mark		Bur 11 O 21
Cowden, Mark		Bur 11 O 23
Cowden, Mark		Bur 11 O 22
Crawford, Rev. J. Cockins	1	Bur 9N80
Crawford, Mattbew	2	Bur 10 O 20
Crawford, Mattbew	4	Bur 10 O 11
Crawford, Mattbew	1	Bur 10 O 14
Crawford, Matthew		Bur 10 O 17
Crawford, Mattbew		Bur 10 O 21
Crawford ?	6	Car 10A18
Crawford ? (33A)	7	Bur 10 O 16
Crooks, Richard (Lauff)	1	Bur 7N3
Crooks, Richard	2	Bur 7N4
Crowley, William	1	Car 9A45
Crowley, William (Amon Co.)	1	Car 9A47
Crowley, William	2	Car 9A50
Crowley, William		Car 9A49
Crowley, William		Car 9A53
Cubbage, S. J.	1	Car 11B28
Cubbage, S. J.	2?	Car 11B42
Cubbage, S. J.	3	Car 11C13
Cubbage, S. J.	4	Car 11C11
Cubbage, S. J.	5	Car 11B29
Cubbage, S. J.	6	Car 11B19
Cubbage Heirs	6	Car 10C31
Cubbage Heirs	7	Car 10C13
Cubbage Heirs	9	Car 10C28
Cubbage Heirs	7	Car 10B9
Cubbage Heirs		Car 10B10
Cubbage Heirs		Car 10B18
Cubbage Heirs		Car 10B23
Cubbage Heirs		Car 10B29
Cubbage Heirs		Car 10B31
Cubbage Heirs		Car 10C19
Cubbage Heirs		Car 10C37
Cuniff, P.	1	Car 9A15

D

Dallenback Estate		Car 2I11
Danche		Bur 9M28
Danche		Bur 9N50

Daugherty, W. H. (H. H.)	1?	Car 4G29
Daugherty, W. H. (H. H.)	2	Car 4G18
Daugherty, W. H. (H. H.)	3	Car 4G19
Davis, George		Car 4J6
Davis, George		Car 4J7
Davis, George		Car 4J9
Davis, George		Car 4J10
Davis, George		Car 4J11
Deblander	1	Bur 9N45
Deblander	2	Bur 9N46
Deblander	3	Bur 9N47
Deblander	4	Bur 9N41
Dickson, D. F.	2	Car 9C47
Dickson, D. F.	3?	Car 9C40
Dickson, D. F.	3 or 1?	Car 9C39
Dickson, R. M.		Bur 8M2
Dickson, Samuel (Heirs)	1	Car 4C3
Dickson, W. A.	1	Car 9C19
Dickson, W. A.	2?	Car 9C12
Dickson, W. A.	3	Car 9C26
Dickson, W. A.	4	Car 9C22
Dickson, W. A.	5	Car 9B19
Dickson, W. A.	6	Car 9B25
Dickson, W. A.	7	Car 9C5
Dickson, W. A.	8	Car 9C11
Dickson, W. A.	9	Car 9C16
Dickson, W. A.	10	Car 9C29
Dickson, W. A.	11	Car 9C17
Dickson, W. A.	12	Car 9C27
Dickson, W. A.		Car 9C24
Doehre ?		Bur 9M31
Donaldson, E. C.		Bur 7M1
Donaldson, E. C.		Bur 7N5
Donaldson, E. C.		Bur 7N6
Donaldson, J. A.	2 or 1	Car 11B54
Donaldson, J. A.	3	Car 11B63
Donaldson, J. A. ?		Car 11B46
Donaldson, J. A.	2?	Car 11B51
Donaldson, Richard	1	Bur 8M1
Connell, Robert J.		Bur 7M2
Douglas, George		Car 2H1
Douglas, George		Car 2H2
Douglas, J. A.	1	Bur 7 O 2
Durantiar, V.	1	Car 7 O 42

E

Echert, John	1	Car 2G6
Echert, John	2	Car 2G3
Edmundson Heirs	1	Car 3H30
Edmundson Heirs		Car 3H28
Edmundson Heirs		Car 3H29
Eichelberger, A.		Car 2H6
Eichelberger, A.		Car 2H7
Eichelberger, A.		Car 2H8
Eichelberger, A.		Car 2H9
Eichelberger, A.		Car 2H11
Eichelberger, A.		Car 2H12
Eichelberger, A.		Car 2H14
Eichelberger, A.		Car 2H16
Elliott Bros.	1	Car 7B31
Elliott Bros.	1	Car 8A11
Elliott Bros.	2	Car 7A33
Elliott Bros.	2	Car 8B3
Elliott Bros.	3	Car 8A5
Elliott Bros.	4	Car 7A26
Elliott Bros.	5	Car 7A24
Elliott Bros.	6	Car 7A22
Elliott Bros.	7	Car 7A14
Elliott Bros.	7	Car 7B37
Elliott Bros.	8	Car 7A2
Elliott Bros.	9	Car 7A20
Elliott Bros.	10	Car 7A4
Elliott Bros.	11	Car 7A12
Elliott Bros.	12	Car 7A7
Elliott Bros.	13	Car 7A17
Elliott Bros.	14	Car 7A10
Elliott Bros.	15	Car 7A18
Elliott Bros.	16	Car 7A8
Elliott Bros.	17	Car 7A21
Elliott Bros.	18	Car 7A15
Elliott Bros.	19	Car 7A11
Elliott Bros.	20	Car 7A6
Elliott Bros.		Car 7A9
Elliott Bros.		Car 7A19
Elliott Bros.		Car 7B22
Elliott Bros.		Car 7B27
Elliott Bros.		Car 7B38
Engle, Henry		Bur 12 O 1
Equitable Land Association		Car 1K5
Espe	1	Bur 10N2
Espe	2	Bur 10N3
Espe	3	Bur 10N1
Etoni, Z. ?		Bur 9N28
Ewing, Addison		Car 1J28
Ewing, Addison		Car 1J30
Ewing, Addison		Car 1J31
Ewing, John N.	1	Car 4E1
Ewing, J. N.	1	Car 5E51
Ewing, J. N.	2	Car 5E47
Ewing, J. N.	3	Car 5E49
Ewing, J. N.	4	Car 5E53
Ewing, J. N.	5	Car 6E2
Ewing, J. N.	6	Car 5E54
Ewing, J. N.	7	Car 5E52
Ewing, J. Y.	1	Car 4F9
Ewing, J. Y.	2	Car 4F14
Ewing, Joseph		Car 1J16
Ewing, Joseph		Car 1J20
Ewing, Joseph		Car 1J22
Ewing, Joseph		Car 1J24
Ewing, Joseph		Car 1J25
Ewing, Mary and Williams, Jane		Car 6F2
Ewing, Mary and Williams, Jane		Car 6F3
Ewing, Mary and Williams, Jane		Car 6F4
Ewing, Mary and Williams, Jane		Car 6F5
Ewing, W. P.		Car 6F6
Ewing	9	Car 1J21

F

Falck, Henry	1	Car 3G2
Falck, Henry		Car 3G3
Falck, Henry ?		Car 3H11
Falck, J.	5	Car 3J9
Farrar, R. S.		Bur 10M6
Farrar, R. S.		Bur 10M7
Farrar, R. S.		Bur 10M8
Farrar, R. S.		Bur 10M10
Farrar, S. A.		Bur 9L7
Farrar, S. A.	1	Bur 10L5
Farrar, S. A.		Bur 10L4
Farrar, S. A.		Bur 10L6
Fayall, A.	1	Car 8A23
Fayall, A.	2	Car 8A17
Fayall, A.	3	Car 8A18
Fayall, A.	5	Car 8A8
Fayette Coal Co. ?	1?	Car 7D35
Fayette Coal Co. ?	5	Car 7D43
Fife, J. M.		Car 6B4
Fife, J. M.		Car 6B6
Fisher, Robert M.	1	Car 6A10
Fortwangle Estate	1	Car 4J4
Fortwangle Estate	2	Car 4J8
Freeman		Car 7D20
Fritsch, Louis	1	Car 3I19
Fritsch, Louis	2	Car 3I18
Fritsch, Louis	3	Car 3I15
Fritsch, Louis	5	Car 3I30
Fritsch, Louis	6	Car 3I29
Fritsch, Louis	7	Car 3I22
Fritsch, Louis	8	Car 3I26
Fritsch, Louis	9	Car 3I27
Fritsch, Louis	10	Car 3I31
Fritsch, Louis		Car 3I32
Fritsch, Louis		Car 3I38

G

Gamble, Thomas (Gamble)	1	Car 6D2
Gamble, Thomas (Tidal)	1	Car 6D8
Gamble, Thomas (Tidal)	2	Car 6D9
Gamble, Thomas (Gamble)	5	Car 6D4
Gamble, Thomas (Gamble)	6	Car 6D6
Gamble, Thomas (Tidal)	6	Car 6D7
Gamble, Thomas (Tidal)		Car 6D14
Geiser, M.		Car 5G2
Geiser, M.		Car 5G5
Geiser, M.		Car 5G6
Geisler, George		Car 2H19
Geisler, George		Car 2H20
George, C. J.	1 or 2	Bur 9N56
George, C. J.	2 or 1	Bur 9N57
George, C. J.	1 or 9?	Bur 9N67
George, C. J. (4A)	1	Bur 9N82
George, C. J.	2 or 1	Bur 9N73
George, C. J. (4A)	2	Bur 9N81
George, C. J.	3 or 4	Bur 9N58
George, C. J.	3 or 4	Bur 9N63
George, C. J.	3	Bur 9N74
George, C. J.	4	Bur 9N77
George, C. J.	5 or 6	Bur 9N54
George, C. J.	5	Bur 9N71
George, C. J.	6 or 5	Bur 9N65
George, C. J.	7	Bur 9N68
George, C. J.	8	Bur 9N60
George, C. J.	9	Bur 9N64
George, C. J.		Bur 9N59
George, C. J.		Bur 9N69
George, J. J.	1 or 2	Bur 9N75
George, J. J.	1A?	Bur 10 O 1
George, J. J.	2	Bur 9N72
George, J. J.	3	Bur 9 O 57
George, J. J.	4	Bur 9 O 58
George, J. J.	5	Bur 9N66
George, R. S.		Bur 10M1
George, R. S.		Bur 10M2
George, R. S.		Bur 10M5
George, R. S.		Bur 10M9
George, R. S.		Bur 10M11
George, R. S.		Bur 10M12
George, Samuel		Bur 9L5
George Heirs	1	Bur 11 O 14
George Heirs	2	Bur 11 O 9
George Heirs	3	Bur 11 O 10
George Heirs	4	Bur 11 O 11
George Heirs	5	Bur 11 O 12
George Heirs		Bur 11 O 17
Gibson, B. M.	1	Car 7E2
Gibson Heirs, David	3	Car 1I22
Gibson Heirs, David	4	Car 1I24
Gibson Heirs, David		Car 1I14
Gibson Heirs, David		Car 1I18
Gibson Heirs, David		Car 1I21
Gibson Heirs, David		Car 1I23
Gibson Heirs, David		Car 1I25
Gibson		Car 7D30
Giffin, J. F.	1	Car 12B5
Giffin, J. F.	2	Car 12B8
Giffin, J. W.	1	Car 11B25
Giffin, J. W.	2	Car 11B44
Giffin, J. W.	3	Car 11B27
Giffin, J. W.	4	Car 11B52
Giffin, J. W.	5	Car 11B34
Giffin, J. W.	6	Car 11B48
Giffin, J. W.	7	Car 11B41
Giffin, J. W.	8	Car 11B32
Giffin, J. W.	9	Car 11B14
Giffin, J. W.	10	Car 11B23
Giffin, J. W.	11	Car 11B17
Giffin, J. W.	12	Car 11B31
Gillian, James	1	Car 7C35
Gladden, J. R.	1	Car 9A39
Gladden, J. R.	2 or 12	Bur 10 O 7
Gladden, J. R.	3 or 13	Bur 10 O 5
Gladden, J. R.	4	Bur 9 O 65
Gladden, J. R.	5	Car 10A2
Gladden, J. R.	6	Car 10A10
Gladden, J. R.	8	Bur 9 O 70
Gladden, J. R.	9	Bur 9 O 47
Gladden, J. R.	10	Car 9A44
Gladden, J. R.	11	Car 9A51
Gladden, J. R.	12	Car 9A38
Gladden, J. R.	14 or 13	Car 10A3
Gladden, J. R.	15	Car 9A57
Gladden, J. R.	16	Car 9A42
Gladden, J. R.	17	Car 9A58
Gladden, J. R.	18	Car 9A54
Gladden, J. R.	19	Car 9A48
Gladden, J. R.	20	Car 9A40
Gladden, J. R.	22	Car 10A4
Gladden, J. R.	23	Car 10A6
Gladden, J. R.		Bur 10 O 6
Gladden, Richard	1	Car 10B12
Gladden, Richard	2	Car 9B56
Gladden, Richard	3	Car 10B3
Gladden, Richard	4	Car 10B7
Gladden, Richard	5	Car 9B45
Gladden, Richard	5	Car 10B15
Gladden, Richard	6	Car 10B17
Gladden, Richard	7	Car 10B14
Gladden, Richard	8	Car 10B11
Gladden, Richard	9	Car 9B58
Gladden, Richard	10	Car 9B49
Gladden, Richard	11	Car 9B52
Gladden, Richard	12	Car 9B46
Gladden, Richard	13	Car 9B47
Gladden, Richard	14	Car 10B2
Gladden, Richard	16	Car 9B53
Glass, A.		Car 4G38
Glass, George N.	1	Car 12B21
Glass, George N.	1	Car 12B28
Glass, George N.	2	Car 12B24
Glass, George N.	3	Car 12B27
Glass, George N.	4	Car 12B31
Glass, George N.	5	Car 12B32
Glass, George N.	6	Car 12B29
Glass, George N.		Car 12B26
Glass, W. M.		Bur 10M13
Glass, W. M.		Bur 10M14
Glenn, Etta	1	Car 7C18
Glenn, John McD.	1	Car 7B42
Glenn, John McD.	1	Car 8C7
Glenn, John McD.	2	Car 8B6
Glenn, John McD.	3 P.I.	Car 7C41
Glenn, John McD.	3	Car 7C37
Glenn, John McD.	4	Car 8C6
Glenn, John McD.	5	Car 8C9
Glenn, John McD.		Car 7C43
Glenn, R. W.	1	Car 7C14
Glenn, R. W.	3	Car 7C28
Glenn, R. W.	5	Car 7C22
Gordon, Joseph	1	Bur 8N23
Gordon, Joseph	2	Bur 9N3
Gormley, J. T.		Car 3G18
Gormley, James	1	Car 6C22
Gormley, James	2	Car 6C30
Gormley, James	3	Car 6C1
Gormley, James	4	Car 5C27
Gormley, James	5	Car 6C5
Gormley, James	6	Car 6C25
Gormley, James	7	Car 6C20
Gormley, James	8	Car 6C15
Gormley, James	9	Car 6C11
Gormley, James	10	Car 6C18
Gormley, James	11	Car 6C12
Gormley, James	12	Car 6C7
Gormley, James	14	Car 6C29
Gormley, James	15	Car 6C21
Gormley, James	17	Car 6C17
Gormley, James	19	Car 6C26
Gormley, James	20	Car 6C6
Gormley, James	21	Car 6B3
Gormley, James	22	Car 6B2
Gormley, James		Car 6C16
Gormley, James		Car 6C19
Gregg, Heirs	1	Car 6F10
Gregg, Heirs	2	Car 6E38
Gregg, Heirs	4	Car 6F13
Gregg, Heirs	5	Car 6F11
Gregg, Heirs		Car 6F8
Gregg, Heirs		Car 6F12
Gregg	1	Car 6F15
Gregg	3	Car 6F14
Gurgundy, A.	1	Car 2I16

Gurgundy, A.	2	Car 2I19
Gurgundy, A.		Car 2I17
Guy, J. W.	1	Car 7D3
Guy, J. W.	2	Car 6D31

H

Hack, George		Car 4H6
Hadden, J. A. ?		Car 7D31
Hadden, J. A. ?		Car 7D34
Hadden, J. A. ?		Car 7D38
Hallam, Thomas	1	Car 9C31
Hallam, Thomas	2	Car 9B31
Hamilton	1	Car 1K2
Harper Heirs	1	Car 11A99
Harper Heirs	2	Car 12A1
Harper Heirs	3	Car 11A93
Harper Heirs	4	Car 11A104
Harper Heirs	5	Car 11A89
Harper Heirs	6	Car 11A83
Harper Heirs	7	Car 12A2
Harper Heirs	9	Car 11A102
Harper Heirs	10	Car 11A100
Harper Heirs	11 or 12	Car 11A92
Harper Heirs	12?	Car 11A103
Harper Heirs	8	Car 11A74
Harper Heirs		Car 11A105
Harper (Burgan-Sterling)		Car 11A94
Hartley Estate	1	Car 3I51
Hartley Estate	2	Car 3I39
Hartley Estate	3	Car 3I50
Hartley Estate	4	Car 3I34
Hastings, O. H. & J. M.	2	Car 9D30
Hastings, O. H. & J. M.	3	Car 9D33
Hastings, O. H. & J. M.	4	Car 10D2
Hastings, O. H. & J. M.		Car 9D25
Hastings, O. H. & J. M.		Car 9D28
Hastings, O. H. & J. M.		Car 9D31
Heckel, F. B. Dr.		Car 2J17
Heckle, Freda	1?	Car 2G30
Heckle, Freda	2	Car 2G31
Heckle, Freda		Car 2G13
Heckle, Freda		Car 2G17
Heckle, Freda		Car 2G24
Heckle, Freda		Car 2G25
Heckle, Freda		Car 2G27
Heckle, Freda		Car 2G33
Heckle, Freda		Car 2G34
Herhst, John		Car 1H2
Herriott, J. M.		Bur 13 O 1
Herron, J. B.	1	Car 6C49
Herron, J. B.	2	Car 6C54
Herron, J. B.	3	Car 6C55
Herron, J. B.	4	Car 7C1
Herron, J. B.	5	Car 7C2
Herron, J. B.	6	Car 6C48
Herron, J. B.	7	Car 7C6
Herron, J. B.	8?	Car 7C8
Herron, J. B.	9	Car 6C56
Herron, Thomas		Car 4D2
Herron, W. G.	1	Car 7C7
Herron, W. G. (Susan)	2	Car 7B4
Herron, W. G.	2	Car 7C19
Herron, W. G.	3	Car 7C4
Herron, W. G. (Susan)	4	Car 7B14
Herron, W. G.	5	Car 7C9
Herron, W. G. (Susan)	6	Car 7B8
Herron, W. G.	7	Car 7C20
Herron, W. G.	8	Car 7C17
Herron, W. G.	9	Car 7C10
Herron, W. G.	10	Car 7C15
Herron, W. G.	11	Car 7C12
Herron, W. G.	12	Car 7C3
Herron, W. G.		Car 7C13
Herron, W. G.		Car 7C21
Herron, W. G. ?		Car 7C23
Herron, W. G. ?		Car 7C24
Herron, W. G. ?		Car 7C25
Hetzler, P.		Car 4I11
Hetzler, P.		Car 4I12
Hicks, Charles	2 or 1	Bur 9N23
Hicks, Charles	1 or 2	Bur 9N31
Hissom, S. K.	4	Car 11A16
Hissom, S. K.	8	Car 11A15
Hissom, S. K.	10	Car 11A22
Hopper, Arthur J.	5	Car 9E8
Hopper, Arthur J.		Car 8E27
Hopper, E. V.	1	Car 8E4
Hopper, E. V.	6	Car 8E6
Hopper, E. V. (John & Daniel)		Car 8E17
Hopper, E. V. (John & Daniel)		Car 8E18
Hopper, E. V. (John & Daniel)		Car 8E19
Hopper, E. V. (John & Daniel)		Car 8E10
Hopper, E. V. (John & Daniel)		Car 8E12
Hopper, E. V. (John & Daniel)		Car 8E16
Hopper, E. V. (John & Daniel)		Car 8E17
Hopper, E. V. (John & Daniel)		Car 8E21
Hopper, E. V. (John & Daniel)		Car 8E25
Hopper Heirs, John	1	Car 9E9
Hopper Heirs, John	2	Car 9E3
Hopper Heirs, John	3	Car 9E6
Hopper Heirs, John	4	Car 8E22
Hopper Heirs, John	5	Car 9E2
Hopper Heirs, John	6	Car 8E20
Hopper Heirs, John	8	Car 9E5
Hopper Heirs, John		Car 8E11
Hopper Heirs, John		Car 8E13
Hopper Heirs, John		Car 8E15
Hopper Heirs, John		Car 8E18
Hopper Heirs, John		Car 8E23
Hopper Heirs, John		Car 8E24
Hopper Heirs, John		Car 8E26
Hopper Heirs, John		Car 8E28
Hopper Heirs, John		Car 8E29
Hopper Heirs, John		Car 9E7
Hopper, Samuel	1	Car 7A16
Hopper, Samuel	2	Car 7A3
Hopper, Samuel	3	Car 7A5
Hopper, Samuel	4	Car 7A13
Howell, J. W. (Lindsey Heirs) ?		Car 12B36
Howell, J. W. (Lindsey Heirs)		Car 12B39
Hutchinson, F. A.	1	Car 6B15
Hutchinson, F. A.		Car 6B13
Hutchinson, F. A.		Car 6B7

I

Jackson, John	2	Car 9E17
Jackson, John	5?	Car 9E19
Jackson, John	5	Car 9E20
Jackson, John		Car 9E16
Jackson, Samuel	4	Car 9E23
Johns, S. S.	1	Car 8A64
Johnson (Burgan-Sterling)		Car 11A98
Johnson (Burgan-Sterling)		Car 11A96
Jordan		Bur 9N48
Jordan		Bur 9N52
Joyce, M.		Car 2J2
Joyce, M.		Car 2J6

K

Kelly, John W.		Car 10B32
Kelly, John W.		Car 10B33
Kelly, John W.		Car 10B37
Kelly, John W.		Car 10B40
Kelly, John W.		Car 10B41
Kelly, John W.		Car 10B42
Kelly, John W.		Car 11B2
Kelly, John W.		Car 11B6
Kelly, John W.		Car 11B7
Kelly, John W.		Car 11B8

Kelly, John W.		Car 11C1
Kelso, B. M.	1	Car 8C8
Kelso, B. M.	3	Car 8C24
Kelso, B. M.	4	Car 8C15
Kelso, B. M.	6	Car 8D1
Kelso, B. M.		Car 8D3
Kelso, George & W. W.	1	Car 10C47
Kelso, George & W. W.	2	Car 11C2
Kelso, George & W. W.	3	Car 10C46
Kelso, George & W. W.	5	Car 10C44
Kelso, George & W. W.	6	Car 10C48
Kelso, George & W. W.	7	Car 10C43
Kelso, George & W. W.		Car 10C45
Kelso, George & W. W.		Car 10C49
Kelso, George & W. W.		Car 11C3
Kelso, J. R.	1	Bur 10 O 2
Kelso, J. R.	5	Bur 9N83
Kelso, J. R.		Bur 9N79
Kelso, J. R.		Bur 10 O 3
Kelso, J. R.		Bur 10 O 9
Kelso, J. R.		Bur 10 O 15
Kelso, J. R.		Bur 10 O 22
Kelso, Louisa	1?	Car 5F35
Kelso, Louisa	2	Car 5F36
Kelso, Louisa		Car 5F40
Kelso, Louisa		Car 5F41
Kelso, W. H.	1?	Car 11C6
Kelso, W. H.	2?	Car 11C7
Kelso, W. H.	3?	Car 11C10
Kelso, W. H.		Car 11C12
Kelso, W. J.	1	Bur 10 O 24
Kelso, W. J.	2	Bur 10 O 37
Kelso, W. J.	3	Bur 10 O 29
Kelso, W. J.	4	Car 10A25
Kelso, W. J.	5	Car 10A29
Kelso, W. J.	6	Car 10A32
Kelso	2	Car 4F52
Kelso	4?	Car 5F1
Kelso	12	Car 4F41
Kelso		Car 4F40
Kelso ?		Car 4F46
Kelso		Car 4F47
Kelso		Car 4F48
Kelso		Car 4F50
Kelso		Car 4F51
Kelso		Car 4F53
Kelso		Car 5F3
Kemp, Agnes	1	Car 6E24
Kemp, Agnes	2	Car 6E34
Kemp, Agnes	3	Car 6E29
Kemp, Agnes	4	Car 6E27
Kennedy, George	2	Car 6E35
Kennedy, George		Car 6D17
Kennedy, George		Car 6D21
Kennedy, George		Car 6D22
Kennedy, George		Car 6D24
Kennedy, George		Car 6D25
Kennedy, George		Car 6E33
Kennedy, George		Car 7E1
Kirk, James	1	Car 8D17
Kirk, James	2	Car 8D19
Kirk, James	3	Car 8D15
Kirk, James	4	Car 9D1
Kirk, James (Moran)	1	Car 8D11
Kirk, James (Moran)	2	Car 8D14
Kirk, James (Moran)	3	Car 8C55
Kirk, James (Moran)	4	Car 8D18
Kirk, James (Moran)	5	Car 9C2
Kress, F. J.	1	Bur 9N35
Kress, F. J.	2	Bur 9N40

L

Lauff, Margaret		Bur 7 O 1
Lear, Robert		Car 4I13
Leech, Oliver	2	Car 1J23
Leech, Oliver		Car 1J17
Leech, Oliver		Car 1J26
Leech, Oliver		Car 1J27
Leipold, (Plummer)		Bur 9M39
Linton, Samuel		Car 4F33
Linton, Samuel		Car 4F32
Linton, Samuel		Car 4F38
Little, James A.	1	Car 11A1
Little, James A.	2	Car 10A24
Little, James A.	3	Car 10A37
Little, James A.	5	Car 10A38
Little, James A.	6	Car 10A42
Little, James A.	7	Car 10A36
Little, James A.	9	Car 10A27
Little, James A.	10	Car 10A41
Little, James A.	11	Car 11A10
Little, James A.	12	Car 10A45
Little, James A.	13	Car 10A48
Little, James A.	14	Car 10A33
Little, James A.	15	Car 10A44
Little, James A.	16	Car 11A2
Little, James A.	17	Car 10A40
Little, James A.	18	Car 11A5
Little, James A.	19	Car 11A3
Little, James A.	20	Car 10A43
Little, James A.	21	Car 10A46
Little, James A.	22	Bur 11 O 2
Little, James A.	23	Car 11A4
Little, James A.		Car 10A34
Lloyd, R. J.	1	Car 4F21
Lloyd, R. J.	2 or 3?	Car 4F20
Loffert, William		Bur 9L4
Lorrain, Nancy	1	Car 4E24
Lorrain, Nancy	2	Car 4E18
Lorrain, Nancy	3	Car 4E14
Lorrain, Nancy		Car 4E11
Lorrain, Nancy		Car 4E22
Lorish, C.		Car 3I43
Lorish, C.		Car 3I47
Lorish, C.		Car 3I50
Lutz, John	1	Car 5D1
Lutz, John		Car 5D3
Lutz, John	1	Car 4D7

M

Magnus Heirs, P. J.	1	Car 1H16
Magnus Heirs, P. J.	1?	Car 1H4
Magnus Heirs, P. J.	2	Car 1H10
Magnus Heirs, P. J.	2	Car 1H17
Magnus Heirs, P. J.	3	Car 1H5
Magnus Heirs, P. J.	3	Car 1H13
Magnus Heirs, P. J.	5?	Car 1H7
Magnus Heirs, P. J.	6	Car 1H9
Magnus Heirs, P. J.	7	Car 1H11
Magnus Heirs, P. J.		Car 1H12
Maguire, Joseph		Car 1I28
Mankedick, F.	1	Car 11B62
Mankedick, F.	2	Car 11B61
Mankedick, F.	3	Car 11B49
Mankedick, F.	4	Car 11C14
Mankedick, F.	5	Car 12B9
Mankedick, F.	7	Car 11B58
Mankedick, F.		Car 11B67
Mankedick, Frank	5	Car 8C19
Mankedick, Frank	6	Car 8C23
Mankedick, Frank	7	Car 8C22
Mankedick, Frank	8?	Car 8C14
Mankedick, Frank	10?	Car 8C12
Mankedick, Frank		Car 8C1
Mankedick, Frank		Car 8C2
Mankedick, Frank		Car 8C3
Mankedick, Frank		Car 8C10
Mankedick, Frank		Car 8C11
Mankedick, Frank		Car 8C13
Mankedick, Frank		Car 8C18
Mankedick, Frank		Car 8C21
Mankedick, Frank		Car 8C25
Mankedick, Frank		Car 8C27
Mankedick		Car 7C38
Mankedick		Car 7C39
Mankedick		Car 7C40
Mankedick		Car 8C4
Mankedick		Car 8C5
Marshall, Robert	3	Car 7C42
Marshall, Robert ?		Car 7C26
Marshall, Robert ?		Car 7C27
Marshall, Robert ?		Car 7C29
Marshall, Rohert ?		Car 7C30
Marshall, Robert ?		Car 7C31

Marshall, Robert ?		Car 7C32
Marshall, Robert		Car 7C33
Marshall Heirs, Robert	2	Car 7D32
Marshall Heirs, Robert	4	Car 7D48
Marshall Heirs, Robert	5	Car 7D28
Marsball Heirs, Robert	6	Car 7D22
Marshall Heirs, Robert	9	Car 7D33
Marshall Heirs, Robert	10	Car 7D40
Matchett		Car 1I15
Matchett		Car 1I16
Matchett		Car 1I17
Matchett		Car 1I19
Mathews, Ewing	1	Car 6C14
Mathews, Ewing	2	Car 5D18
Mathews, Ewing	3	Car 5D19
Mathews, Ewing		Car 6D1
Mathews, J. J.	1	Car 6C52
Mathews, J. J.	2	Car 6C44
Mathews, J. J.	3	Car 6C43
Matbews, J. J.	5	Car 6C36
Mathews, J. J.	6	Car 6C34
Matbews, J. J.	7	Car 6C32
Mathews, J. J.	8	Car 6C35
Mathews Heirs	1	Car 6C45
Matbews Heirs	2	Car 6B16
Mathews Heirs	3	Car 6C38
Mathews Heirs	5	Car 6C33
Mathews Heirs	6	Car 6C28
Mathews Heirs	7	Car 6C24
Mathews Heirs	8	Car 6C39
Mathews Heirs	9	Car 6C37
May, J. B.	1	Car 11A101
May, J. B. (Jane Ann)	2	Car 11A97
McAdams, S. J.	1	Bur 7 O 6
McAdams, S. J.		Bur 8 O 1
McBride Estate	1	Car 4J13
McBride Estate	2	Car 4J14
McBride Estate	3	Car 4J18
McBride Estate		Car 4J16
McBride Estate		Car 4J17
McBride Heirs, W. H.		Bur 10M15
McBride Heirs, W. H.		Bur 10N6
McBurney, E. (W. A.)	2	Bur 9L3
McBurney, E. (W. A.)		Bur 9K2
McBurney, E.		Bur 10L7
McBurney, E		Bur 10L9
McBurney, John R.	1	Bur 9N12
McBurney, John R.	2	Bur 9N21
McBurney, John R.	3	Bur 9N20
McBurney, John R.	4	Bur 9N4
McBurney, John R.	5	Bur 8N14
McBurney, John R.	6	Bur 9N13
McBurney, John R.	7	Bur 8N24
McBurney, John R.	8	Bur 8N15
McBurney, John R.	9	Bur 9N8
McBurney, John R.	10	Bur 9N24
McBurney, John R.	11	Bur 9N17
McBurney, John R.	12	Bur 8N16
McBurney, John R.	13	Bur 8N10
McCain, A.		Car 3I7
McCarty, B. R.	1	Bur 9N78
McCarty, B. R.	2	Bur 9N70
McCarty, B. R.	3	Bur 9N62
McCarty, B. R.	4	Bur 9M34
McCarty, B. R.		Bur 9N76
McCarty Heirs	1?	Bur 9M40
McCarty Heirs	2	Bur 9M32
McCarty Heirs	3	Bur 9M26
McCarty Heirs	4?	Bur 10M3
McCarty Heirs	5	Bur 9M24
McCarty Heirs	6	Bur 9M33
McCarty Heirs	7 or1	Bur 10M4
McCarty Heirs	8?	Bur 9M37
McCarty Heirs	9	Bur 9M38
McCarty Heirs	10	Bur 9M35
McClelland Heirs	1	Car 6E26
McClelland Heirs	2	Car 6E31
McClelland Heirs	6	Car 6E36
McCloskey, Henry (Dickinson)		Car 3F1
McCloskey, Henry (Dickinson)		Car 3F2
McConnoughy, M.		Bur 11M1
McCormick, B. H.	1	Car 4G14
McCormick, B. H.	2	Car 4G7
McCormick, B. H.		Car 4G5
McCoy, Thomas & William		Car 1J34
McCoy, Thomas & William		Car 2J1
McCoy, Thomas & William		Car 2J3
McCoy, Thomas & William		Car 2J4
McCoy, Thomas & William		Car 2J5
McCoy, Thomas & William		Car 2J7
McCoy, Thomas & William		Car 2J8
McCoy, Thomas & William		Car 2J9
McCoy, Thomas & William		Car 2J12
McCurdy, J. J.	1	Car 4F31
McCurdy, J. J.	2	Car 4F22
McCurdy, J. J.	3	Car 4G23
McCurdy, J. J.	4	Car 4G27
McCurdy, J. J.	5	Car 4G36
McCurdy, J. J.	6	Car 4G33
McCurdy, J. J.	7	Car 4F27
McCurdy, J. J.	8	Car 4F44
McCurdy, J. J.	9	Car 4F35
McCurdy, J. J.	10	Car 4F26
McCurdy, J. J.	11	Car 4F37
McCurdy, J. J.		Car 4F43
McDermott, John		Car 4J19
McDonald, Edward	1	Car 9A13
McDonald, Edward	2	Car 8A36
McDonald, Edward	3	Car 8A39
McDonald, Edward	4	Bur 8 O 17
McDonald, Edward	5	Car 9A9
McDonald, Edward	7	Car 8A62
McDonald, Edward	8	Bur 8 O 8
McDonald, Edward	9	Bur 8 O 14
McDonald, Edward	10	Bur 8 O 3
McDonald, Edward	12	Car 9A12
McDonald, Edward	13	Bur 9 O 9
McDonald, Edward	15	Car 8A38
McDonald, Edward	16	Car 8A47
McDonald, Edward	17	Bur 8 O 5
McDonald, Edward	18	Bur 9 O 20
McDonald, Edward	19	Car 8A32
McDonald, Edward	21	Car 8A33
McDonald, Edward	23	Bur 8 O 19
McDonald, Edward	24	Car 8A60
McDonald, Edward	25	Car 8A35
McDonald, Edward	26	Car 8A52
McDonald, Edward	27	Car 8A59
McDonald, Edward	28	Car 8A42
McDonald, Edward	29	Bur 9 O 1
McDonald, Edward		Bur 8 O 9
McDonald, Edward		Car 8A61
McDonald, Edward		Bur 9 O 14
McDonald, Edward		Bur 9 O 16
McDonald, Edward		Car 9A8
McDonald, K. Noble	1	Bur 9 O 4
McDonald, K. Noble	2	Bur 9 O 2
McDonald, K. Noble	3	Bur 8 O 16
McDonald, K. Noble	4	Bur 9 O 50
McDonald, K. Noble	5	Bur 9N29
McDonald, K. Noble	6	Bur 9 O 11
McDonald, K. Noble	7	Bur 9N49
McDonald, K. Noble	8	Bur 8 O 15
McDonald, K. Noble	9	Bur 9 O 37
McDonald, K. Noble	10	Bur 8 O 10
McDonald, K. Noble	11	Bur 9 O 19
McDonald, K. Noble	12	Bur 9 O 8
McDonald, K. Noble	13	Bur 9N55
McDonald, K. Noble	14	Bur 8 O 7
McDonald, K. Noble	15	Bur 9 O 28
McDonald, K. Noble	16	Bur 8 O 2
McDonald, K. Noble	17	Bur 9 O 46
McDonald, K. Noble	18	Bur 9N42
McDonald, K. Noble	19	Bur 9 O 45
McDonald, K. Noble	20	Bur 9 O 27
McDonald, K. Noble	21	Bur 9 O 31
McDonald, K. Noble	22	Bur 9 O 30

McDonald, K. Noble 23 Bur 9 O 25
McDonald, K. Noble 24 Bur 9 O 32
McDonald, K. Noble 25 Bur 9 O 6
McDonald, K. Noble 26 Bur 9 O 33
McDonald, K. Noble 27 Bur 9 O 18
McDonald, K. Noble 28 Bur 9 O 13
McDonald, K. Nohle 29 Bur 9N33
McDonald, K. Noble 30 Bur 9N43
McDonald, K. Noble 31 Bur 9 O 38
McDonald, K. Nohle 32 Bur 9N22
McDonald, K. Noble 33 Bur 9 O 17
McDonald, K. Noble 34 Bur 9 O 10
McDonald, K. Noble 35 Bur 9N9
McDonald, K. Noble 36 Bur 9N6
McDonald, K. Noble 37 Bur 9N14
McDonald, K. Noble 38 Bur 9 O 23
McDonald, K. Nohle 39 Bur 9 O 24
McDonald, K. Noble 40 Bur 9 O 15
McDonald, K. Noble 41 Bur 9 O 3
McDonald, K. Noble 42 Bur 9 O 7
McDonald, K. Noble 43 Bur 9 O 56
McDonald, K. Noble 44 Bur 9 O 41
McDonald, K. Noble 45 Bur 9N15
McDonald, K. Noble 45 Bur 9 O 40
McDonald, K. Noble 46 Bur 9 O 53
McDonald, K. Noble 47 Bur 9 O 48
McDonald, K. Noble 48 Bur 9 O 39
McDonald, K. Noble 49 Bur 9N34
McDonald, K. Noble 50 Bur 9 O 21
McDonald, K. Noble 51 Bur 9 O 12
McDonald, K. Noble 52 Bur 9N5
McDonald, K. Noble 53 Bur 9 O 22
McDonald, K. Noble 54 Bur 9 O 54
McDonald, K. Noble 55 Bur 9 O 43
McDonald, K. Noble 56 Bur 9 O 49
McDonald, K. Noble 57 Bur 9N2
McDonald, K. Noble 58 Bur 9N1
McDonald, K. Noble 59 Bur 8N19
McDonald, K. Noble 60 Bur 8N7
McDonald, K. Noble 61 Bur 8 O 13
McDonald, K. Noble 62 Bur 8 O 18
McDonald, K. Noble 63 Bur 8N9
McDonald, K. Noble 64 Bur 9 O 29
McDonald, K. Noble 65 Bur 8N20
McDonald, K. Noble 66 Bur 8N11
McDonald, K. Noble 67 Bur 8N13
McDonald, K. Noble 68 Bur 8 O 11
McDonald, K. Noble 69 Bur 8 O 12
McDonald, K. Noble 70 Bur 9 O 36
McDonald, K. Nohle Bur 8N12
McDonald, K. Nohle Bur 8N17
McDonald, K. Noble Bur 8N18
McDonald, K. Noble Bur 8 O 6
McDonald, K. Noble Bur 9N53
McDonald, K. Noble Bur 9N61
McDonald, K. Noble Bur 9 O 5
McDonald, K. Noble Bur 9 O 42
McDonald, K. Nohle Bur 9 O 55
McDonald Heirs 1 Car 9A16
McDonald Heirs 3? Car 9A32
McDonald Heirs 3 or 4 Car 9A10
McDonald Heirs 4 Car 9A5
McDonald Heirs 5 Car 9A35
McDonald Heirs 6 Car 9A25
McDonald Heirs 7 Car 9A20
McDonald Heirs 8 Car 9A34
McDonald Heirs 9 Car 9A24
McDonald Heirs 10 Car 9A29
McDonald Heirs 11 Car 9A14
McDonald Heirs 12 Car 9A30
McDonald Heirs 13 Car 9A33
McDonald Heirs 14 Car 9A23
McDonald Heirs 15 Car 9A17
McDonald, Town of Car 8A44
McDonald, Town of Car 8A45
McDonald, Town of Car 8A46
McDonald, Town of Car 8A48
McDonald, Town of Car 8A49
McDonald, Town of Car 8A50
McDonald, Town of Car 8A51
McDonald, Town of Car 8A53
McDonald, Town of Car 8A54
McDonald, Town of Car 8A55
McDonald, Town of Car 8A56
McDonald, Town of Car 8A57
McDonald, Town of Car 8A58
McDonald, Town of Car 8B57
McDonald, Town of Car 8B58
McDonald, Town of Car 8B63
McDonald, Town of Car 8B64
McDonald, Town of Car 8B65
McDonald, Town of Car 8B66
McDonald, Town of Car 8B70
McDonald, Town of Car 8B72
McDowell, S. S.? 1 Car 8B73
McElhenny, E. S. Car 6A1
McElhenny, E. S. Car 6A3
McElhenny, E. S. Car 6B5
McElhenny, E. S. Car 6B8
McElhenny, E. S. Car 6B12
McElhenny, E. S. Car 6B14
McElherran Heirs 1? Car 1H20
McElherran Heirs 2 Car 1H15
McElherran Heirs Car 1H19
McElherran Heirs Car 1H21
McElherran Heirs Car 1H23
McEwen, James 1 Car 8C43
McEwen, James 3 Car 8C45
McEwen, James 7 Car 8C47
McEwen, James 8 Car 8C52
McEwen, James 10 Car 8C59
McEwen, James 11 Car 8C48
MeEwen, James 11? Car 9C6
McEwen, James Car 8C56
McEwen (Steele & Co.) 1 Car 9B37
McGarr, J. E. (J. L.) 1 Car 4F24
McGarr, J. E. (J. L.) 2 Car 4F28
McGarr, J. E. (J. L.) 3 Car 4E13
McGarr, J. E. (J. L.) 4 Car 4E20
McGarr, J. E. (J. L.) 5 Car 4E15
McGill, Jane 1 Car 5E55
McGill, Jane 3 Car 6E7
McGill, Jane 4 Car 6E17
McGill, Jane 5 Car 6E12
McGill, Jane 6 Car 5E56
McGill, Jane 8 Car 6E19
McGill, Jane Car 5E50
McGill, Jane Car 6E11
McGill, W. J. 1 Car 6E6
McGill, W. J. 4 Car 6E1
McGill, W. J. 5 Car 6E18
McGill, W. J. 6 Car 6E10
McGill, W. J. 7 Car 6E22
McGill, W. J. 8 Car 6E8
McGill, W. J. 9 Car 6E14
McGill, W. J. Car 6E4
McGregor, Matthew 1 Car 5E43
McGregor, Matthew 1? Car 5E37
McGregor, Matthew 2 Car 5E46
McGregor, Mrs. Car 5E11
McHenry, M. E. Car 5E39
McKee, Boyle Car 6A9
McKiever, James 6 Car 7D12
McKiever, James Car 7D1
McKiever, James Car 7D8
McKowan, R. H. Car 1H8
McMichael Heirs, Issae 1 Car 5G9
McMichael Heirs, Issae 2 Car 5G11
McMichael Heirs, Issac 3 Car 5G10
McMichael, J. C. 1 Car 4E17
McMichael, J. C. 2 Car 4E7
McMichael, J. C. 3 Car 4E21
McMichael, J. C. 4 Car 4E23
McMichael, J. C. Car 4D8
McMichael, J. C. Car 4E8
McMichael, J. C. Car 4E19
McMichael, J. R. 1 Car 5E10
McMichael, J. R. 2 Car 5E12
McMichael, J. R. 3 Car 5E3
McMichael, J. R. Car 4E28
McMichael, J. R. Car 4E29
McMichael, J. R. Car 4E30
McMillan, Isaac 1? Car 5F33
McMillan, Isaac Car 5F34
McMillan, Isaac Car 5F37
McMillan, Isaac Car 5F38
McMillan, Isaac Car 5F39
McMillan, Isaac Car 5F42

McMillan, M.		Car 1H3
McMillan, M.		Car 1H6
McMillan Heirs, M.	4	Car 1H18
McMurray, G. & W.	1	Car 7D29
McMurray, G. & W.	2	Car 6E9
McMurray, G. & W.	2	Car 7D27
McMurray, G. & W.	3	Car 7D25
McMurray, G. & W.	4	Car 7D16
McMurray, G. & W.	5	Car 7D21
McMurray, G. & W.	6	Car 7D15
McMurray, G. & W.		Car 5D20
McMurray, G. & W.		Car 6D3
McMurray, G. & W.		Car 6E5
McMurray, John	2	Car 7E4
McMurray, John	2?	Car 7E3
McMurray, John	6	Car 7E5
McMurray, John		Car 7E6
McMurray, Joseph	3	Car 5D14
McMurray, Joseph	4	Car 5E42
McMurray, Joseph	5	Car 5D8
McMurray, Joseph	6	Car 5D9
McMurray, Joseph	7	Car 5D13
McMurray, Joseph	8	Car 5D16
McPeak, D.	1	Car 10C40
McPeak, D.	1	Car 10D4
McPeak, W.		Car 10C50
Mertz, A. F.	1?	Car 5F25
Mertz, A. F.		Car 5F17
Mertz, A. F.		Car 5F18
Mertz, A. F.		Car 5F19
Mertz		Car 5F44
Mevey, James	3	Car 8B20
Mevey, James	5 or 15	Car 8B52
Mevey, James	6	Car 7B44
Mevey, James	7	Car 8B2
Mevey, James	8	Car 8B1
Mevey, James	9	Car 8B54
Mevey, James	10	Car 8B60
Mevey, James	11	Car 8B69
Mevey, James	12	Car 8B71
Mevey, James	13	Car 8B39
Mevey, James	14	Car 8B61
Mevey, James	17(1)	Car 8B9
Mevey, James	18	Car 8B4
Mevey, James	19	Car 7B45
Mevey, James	20	Car 7B39
Mevey, James	21	Car 8B17
Mevey, James	22	Car 8B24
Mevey, James	23	Car 8B36
Mevey, James	24	Car 8B41
Mevey, James	25	Car 8B51
Mevey, James	26	Car 8B49
Mevey, James	27	Car 8B31
Mevey, James	28	Car 8B21
Mevey, James	29	Car 8B15
Mevey, James	30	Car 8B14
Mevey, James	31	Car 8B10
Mevey, James		Car 8B8
Mevey, James		Car 8B12
Mevey, James		Car 8B19
Mevey, James		Car 8B26
Mevey, James		Car 8B27
Mevey, James		Car 8B46
Mevey, James		Car 8B62
Mevey, S. J.	1	Car 6E3
Michael	1	Car 1J15
Miller Bros. (Potts)		Car 13A2
Miller, G. H.	1	Car 9B30
Miller, G. H.	2	Car 9B36
Miller, G. H.	3	Car 9B28
Miller, G. H.	4	Car 9B43
Miller, G. H.	5	Car 9B24
Miller, G. H.	6	Car 9B33
Miller, G. H.	7	Car 9B34
Miller & McBride		Car 6E13
Miller & McBride		Car 6E16
Miller & McBride		Car 6E20
Miller & McBride		Car 6E25
Miller & McBride		Car 6E28
Miller, V.	12	Car 8A28
Miller, V.	14	Car 8B33
Miller, V.	16	Car 8B38
Miller, V.	17	Car 8B13
Miller, V.	18	Car 8B7
Miller, V.	19	Car 8A12
Miller, V.	20	Car 7B43
Miller, V.		Car 8A7
Miller, V.		Car 8A19
Miller, V.		Car 8B22
Miller, V.		Car 8B34
Miller, V.		Car 8B68
Miller, W. J.	1	Car 10C23
Miller, W. J.	3	Car 10C32
Miller, W. J.	4	Car 10C42
Miller, W. J.	5	Car 10C17
Miller, W. J.	6	Car 10C27
Miller, W. J.	7	Car 10C18
Miller, W. J.	8	Car 10C22
Miller, W. J.	9	Car 10C26
Miller, W. J.	10	Car 10C14
Miller, W. J.	11	Car 10C29
Miller, W. J.	12	Car 10C38
Miller, W. J.	13	Car 10C35
Miller, W. J.	14	Car 10C33
Miller, W. J.	15	Car 10C34
Miller, W. J.	16	Car 10C41
Miller, W. J.		Car 10C24
Miller Heirs	2	Car 8B30
Miller Heirs	3	Car 8B28
Miller Heirs	4	Car 8B23
Miller Heirs	5	Car 8B45
Miller Heirs	6	Car 8B44
Miller Heirs	8	Car 8B56
Miller Heirs	8?	Car 8B35
Miller Heirs	9	Car 8B59
Miller Heirs	11	Car 8B29
Miller Heirs		Car 8B40
Miller Heirs		Car 8B50
Miller Heirs		Car 8B55
Miller Heirs ?		Car 8B67
Mills, Jane ?		Car 3G13
Mills, Jane ?		Car 3G14
Minech Heirs, L.		Car 3G1
Mitchell, George	1	Car 7C36
Monrean, John		Car 11A26
Monrean, John		Car 11A36
Moore, A. J.	2	Car 12A19
Moore, A. J.	3	Car 12A17
Moore, A. J.	4	Car 12A28
Moore, A. J.	6	Car 12A26
Moore, A. J.	7	Bur 12 O 2
Moore, Emma (James)	1	Car 3G5
Moore, Emma (James)		Car 3G4
Moore, H. P.	1	Car 5E27
Moore, J. A.		Car 5E40
Moore, J. A.		Car 5E41
Moore, J. A.		Car 5E45
Moore, J. G.	1	Car 11A107
Moore, J. G.	2	Car 12A11
Moore, J. G.	3	Car 11B65
Moore, J. G.	4	Car 11A108
Moore, J. G.	5	Car 11A106
Moore, J. G.	6	Car 12A3
Moore, J. G.	7	Car 12B11
Moore, J. G.	8	Car 12A6
Moore, J. G.	9	Car 12A18
Moore, J. G.	10	Car 12A9
Moore, J. G.	11	Car 12A13
Moore, J. G.	13	Car 12B16
Moore, J. G.	14	Car 12A14
Moore, J. G.	15	Car 12A10
Moore, J. G.	16	Car 12A7
Moore, J. G.	17	Car 12A15
Moore, J. G.	18	Car 12B4
Moore, J. G.		Car 12A20
Moore, J. G.		Car 12B22
Moore, J. S.	1	Car 5E32
Moore, James M.	3	Car 2G10
Moore, James M.	6	Car 2G8
Moore, James M.	8	Car 2G9
Moore, James M.		Car 2G11
Moore, James M.		Car 2G12
Moore, James M.		Car 2G14
Moore, James M.		Car 2G15
Moore, James M.		Car 2G16
Moore, James M.		Car 2G18
Moore, James M.		Car 2G19
Moore, James M.		Car 2G20

Moore Heirs	1	Car 11B60
Moore Heirs	2	Car 12B7
Moore Heirs	3	Car 12B6
Moore Heirs	4	Car 11B59
Moore Heirs	5	Car 11B66
Moore Heirs	6	Car 12B2
Moore Heirs		Car 11B56
Moorhead, M.	1	Car 10B1
Moorhead, M.	2	Car 10A13
Moorhead, M.	3	Car 10B5
Moorhead, M.	4	Car 10A8
Moorhead, M.	5	Car 10A20
Moorhead, M.	6	Car 10B8
Moorhead, M.	7	Car 10B6
Moorhead, W. B.	1	Car 9A46
Moorhead, W. B.	2 or 10	Car 9A52
Moorhead, W. B.	3	Car 9A55
Moorhead, W. B.	4	Car 10A7
Moorhead, W. B.	5	Car 10A5
Moorhead, W. B.	6	Car 10A1
Moorhead, W. B.	8	Car 9B57
Moorhead, W. B.	9	Car 9A56
Morgan, Luther		Bur 12N1
Morgan Heirs	1	Car 7B34
Morgan Heirs	2	Car 7B32
Morgan Heirs	3	Car 7B35
Morgan Heirs	4	Car 7B33
Morgan Heirs	5	Car 7B24
Morgan Heirs	6	Car 7B25
Morgan Heirs	7	Car 7B15
Morgan Heirs	8	Car 7B19
Morgan Heirs	9	Car 7B18
Morgan Heirs	10	Car 7B17
Morgan Heirs	11	Car 7B13
Morgan Heirs	12	Car 7B23
Morgan Heirs	13	Car 7B20
Morrow, J. E.		Car 8E3
Morrow, John	2	Car 5C12
Morrow, John	3	Car 5B1
Morrow, John		Car 5C13
Morrow, Thomas & J. E.	1	Car 8E1
Moses, John	1	Bur 9M13
Moses, John	2	Bur 9M10
Moses, John	3	Bur 9M11
Moses, John	4	Bur 9M12
Moses, John	5	Bur 9M3
Moss, Mary		Car 4I5

N

Neely Heirs, John M.	2	Car 5F31
Neely Heirs, John M.	3	Car 5F5
Neely Heirs, John M.	4	Car 5F12
Neely Heirs, John M.	5	Car 5F23
Neely Heirs, John M.	5?	Car 5F27
Neely Heirs, John M.	6	Car 5F32
Neely Heirs, John M.		Car 5F2
Neely Heirs, John M.		Car 5F22
Neely Heirs, John M.		Car 5F30
Nesbit, E. W.	1	Car 7F5
Nesbit, E. W.	2	Car 7F6
Nesbit, John W. ?		Car 7F4
Nesbit, R. N. (W.)		Car 8F1
Nesbit ?		Car 7F7
Neville Island		Car 1J1
Neville Island		Car 1J2
Neville Island		Car 1J3
Neville Island		Car 1J4
Neville Island		Car 1J5
Neville Island		Car 1K1
Neville Island		Car 1K3
Nichols, James	2	Car 4H3
Nichols, James	4	Car 4H1
Nichols Heirs, James	3	Car 3H31
Noble, B.		Car 4F13
Noble, B.		Car 4F15
Noble, B.		Car 4F23
Noble Heirs, William	1	Car 6A4
Noble Heirs, William	2	Car 6A5
Noble Heirs, William		Car 6A2
Noble Heirs, William		Car 6A6
Noble Heirs, William		Car 6A7
Noble Heirs, William		Car 6A8

O

Oakdale Cemetery	1	Car 7D37
Oakdale, Town of		Car 6D23
Oakdale, Town of		Car 6D26
Oakdale, Town of		Car 6D28
Oakdale, Town of		Car 6D29
Oakdale, Town of		Car 7D4
Oakdale, Town of		Car 7D5
Oakdale, Town of		Car 7D9
Oakdale, Town of		Car 7D11
Oakdale, Town of		Car 7D14
Oakdale, Town of		Car 7D17
Oakdale, Town of		Car 7D19
Oak Ridge Coal Co.?		Car 7D18
O'Connell, Thomas	3	Car 6D27
Orris, James	1?	Car 4G41
Osborne	1	Bur 8N5

P

Palmer, J. H.	1	Car 4F19
Palmer, J. H.	2	Car 4F18
Patterson, James	2	Car 12A21
Patterson, James	3	Car 12A23
Patterson, James		Car 12A25
Patterson, John	1	Car 9D27
Patterson, John	2	Car 9D24
Patterson, John	3	Car 9D19
Patterson, John	4	Car 9D15
Patterson, John	5	Car 9D20
Patterson, William	1	Car 2G1
Patterson, William	1	Car 11B13
Patterson, William	2	Car 2G7
Patterson, William	2	Car 11B16
Patterson, William	3	Car 11B21
Patterson, William	4	Car 11B15
Patterson, William	5	Car 11B26
Parsonage		Car 4G17
Parsonage		Car 4G16
Pennsylvania Railroad		Car 3J11
Pennsylvania Railroad		Car 4J2
Pennsylvania Railroad		Car 4J3
Pennsylvania Railroad		Car 4J5
Perkins, Ida B.		Car 4F2
Perkins, Ida B.		Car 4F4
Perkins, Ida B.		Car 4F6
Perkins, Ida B.		Car 4F10
Perkins, Ida B.		Car 4F11
Perkins, Ida B.		Car 4F16
Perkins, Ida B.		Car 4F17
Petrie, John	1	Car 3H22
Petrie, John		Car 3H15
Petrie, John		Car 3H16
Petrie, John		Car 3H21
Petrie, William	1	Car 4I8
Petrie, William	1?	Car 4I3
Petrie, William	2	Car 4I7
Petrie, William	3	Car 4I4
Petrie, William	4	Car 3I54
Petrie, William	5	Car 4I1
Petrie, William		Car 4I10
Phillips, Jonathan (M. S.)	1	Car 2G32
Phillips, Jonathan (M. S.)	2	Car 2G28
Phillips, Jonathan (Sam)	3	Car 2G22
Phillips, Jonathan (Sam)	4?	Car 2G21
Phillips, Jonathan (Sam)		Car 2G23
Phillips, Jonathan (Sam)		Car 2G26
Phillips, Jonathan (Sam)		Car 2H17
Phillips, S. B.	1	Car 3H1
Phillips (?), S. B.		Car 3H3
Phillips, S. J. (Moore)	3	Car 2G4
Phillips, S. J. (Moore)	4	Car 2G2
Phillips, W. S.		Car 2H21
Pittsburgh Coal Company	1?	Car 3I43

Pittsburgh Coal Company	1	Car 5F4
Pittsburgh Coal Company	1	Car 5F6
Pittsburgh Coal Company	1	Car 5F24
Pittsburgh Coal Company	1	Bur 7N2
Pittsburgh Coal Company	1	Bur 9L2
Pittsburgh Coal Company	2	Car 5F8
Pittsburgh Coal Company	2?	Car 5F13
Pittsburgh Coal Company	2	Bur 7N1
Pittsburgh Coal Company	3	Car 5F14
Pittsburgh Coal Company	4	Car 5F10
Pittsburgh Coal Company	5	Car 5F15
Pittsburgh Coal Company		Car 3I47
Pittsburgh Coal Company		Car 3I52
Pittsburgh Coal Company		Car 4D4
Pittsburgh Coal Company		Car 4I2
Pittsburgh Coal Company		Car 4I6
Pittsburgh Coal Company		Car 4I14
Pittsburgh Coal Company		Car 4J12
Pittsburgh Coal Company		Car 4J15
Pittsburgh Coal Company		Car 5F28
Pittsburgh Coal Company		Car 5G7
Pittsburgh Coal Company		Car 5G8
Pittsburgh Coal Company		Car 8B53
Pittsburgh Coal Company		Car 8C30
Pittsburgh Coal Company		Car 8C31
Pittsburgh Coal Company		Car 8C36
Pittsburgh Coal Company		Car 8C37
Pittsburgh Coal Company		Car 9A3
Pittsburgh Coal Company		Bur 9LI
Pittsburgh National Coal Company	1	Car 7D23
Pittsburgh National Coal Company	2	Car 7D26
Plummer (Leipold)	1	Bur 9M41
Plummer (Leipold)	2	Bur 9M36
Plummer (Leipold)	5?	Bur 9L6
Portman, P.	1	Car 3I48
Portman, P.	2	Car 3I45
Portman, P.	3	Car 3I53
Portman, P.		Car 3I41
Potter, R. D.	1 or 2	Car 9C23
Potter, R. D.	2	Car 9C30
Potter, R. D.	3 or 5	Car 9C28
Potter, R. D.	5	Car 9C32
Potter, R. D.	7?	Car 9C36
Potter, R. D.	7?	Car 9C35
Potter, R. D.	8	Car 9C34
Potter, R. D.		Car 9C33
Prevost, D.	1	Bur 9M29
Prevost, D.	2	Bur 9M15
Prevost, D.	3	Bur 9M18
Prevost, D.		Bur 9M14
Prevost, D.		Bur 9M17
Prevost, D. ?		Bur 9M25

Q

Quinn, James		Car 4D3
Quinn, James		Car 4D5

R

Raab, H. G. (Robb Brothers)	1?	Bur 10L1
Raab, H. G.		Bur 10L10
Real Estate	1	Car 5F43
Real Estate	2	Car 5F47
Real Estate	3	Car 5F45
Reddick ?		Bur 8N8
Redmond, Thomas	1?	Bur 8N22
Redmond, Thomas		Bur 8N21
Reed, George M.	1	Bur 11N10
Reed, George M.	2	Bur 11N14
Reed, George M.	3	Bur 11N8
Reed, George M.	4	Bur 11N6
Reed, George M.		Bur 11N12
Reed, George M.		Bur 11N13
Rend, W. P.	1	Car 9C51
Rend, W. P.	2	Car 9C50
Rend, W. P.	3	Car 9C48
Rend, W. P.	4	Car 10C3
Rend, W. P.	5	Car 9D34
Rend, W. P.	6	Car 10C6
Rend, W. P.	7	Car 9C41
Rend, W. P.		Car 9A2
Rend, W. P.		Car 9C43
Rice, George		Car 2G29
Riddle, J. W.	1	Car 4G6
Riddle, J. W.	2?	Car 4G13
Riddle, J. W.	3	Car 4G8
Riddle, Jane	2	Car 3G27
Riddle, Jane		Car 3F5
Riddle, Jane		Car 3G21
Riddle, Jane		Car 3G25
Riddle, Jane		Car 4G2
Riddle, Jane		Car 4G3
Riddle, Jane		Car 4G4
Riddle, Jane		Car 4G9
Riddle, Jane		Car 4G10
Riddle, W. E.		Car 4G11
Riddle, W. E.		Car 4G12
Riddle, W. E.		Car 4G20
Robb, J. W.	2	Car 8A1
Robb, J. W.	3	Bur 7 O 7
Robb, J. W.	6	Bur 7 O 4
Robb, J. W.	7	Car 8A13
Robb, J. W.		Bur 7 O 5
Robb, James	4	Car 7A31
Robb, James	5	Car 8A2
Robb, John		Car 5C4
Robb, John		Car 5C22
Robb, John (Smith Company)		Car 5D4
Robb, John (Smith Company)		Car 5D5
Robb, John (Smith Company)		Car 5D6
Robb, John S. (Mark)	3	Car 7A23
Robb, John S. (Mark)		Car 7A27
Robb, John S. (Mark)		Car 7A30
Robb, John S.		Bur 7 O 3
Robb, Joseph	1	Car 8A9
Robb, Joseph	4	Car 8A14
Robb, Joseph	5	Bur 8 O 4
Robb, Mary	1	Car 8A15
Robb, Mary	3	Car 8A4
Robb, Mary	4	Car 7A32
Robb, William S.	1	Car 8A20
Robb, William S.	2	Car 8A24
Robb Heirs	1	Car 5C23
Robb Heirs	1	Car 8C20
Robb Heirs	1?	Car 8C35
Robb Heirs	2	Car 5B2
Robb Heirs	3	Car 8C39
Robb Heirs	5	Car 8C44

Robb Heirs	6	Car 8C26
Robb Heirs	7	Car 8C42
Robb Heirs	8	Car 8C33
Robb Heirs		Car 8C28
Robb Heirs		Car 8C29
Robb Heirs		Car 8C32
Robb	1	Car 8A21
Robb	2	Car 8A10
Robb	2	Car 8A16
Robb	3	Car 8A3
Robbins, T. B.	1	Bur 9M27
Robbins, T. B.	2?	Car 9A31
Robbins, T. B.	2	Car 9A28
Robbins, T. B.	3	Car 9A27
Robbins, T. B.	4	Bur 9 O 26
Robbins, T. B.		Bur 9N25
Robbins, T. B.		Bur 9N32
Robbins, T. B. lot	1	Car 9A19
Robbins, T. B. & Son	1	Bur 10 O 19
Robbins, T. B. & Son	2	Car 10A17
Robbins, T. B. & Son	3	Bur 10 O 18
Robbins, T. B. & Son	4	Car 10A22
Robbins, T. B. & Son	5	Car 10A21
Robbins, T. B. & Son	6 or 7	Car 10A12
Robbins, T. B. & Son	7 or 6	Bur 10A11
Robbins, T. B. & Son	8	Car 10A16
Robbins, T. B. & Son	9	Car 10A19
Robinson Run Cemetery		Car 8C40
Robinson, S. B. & Gillespie, D. J.		Car 1I3
Robinson, S. B. & Gillespie, D. J.		Car 1I6
Robinson, S. B. & Gillespie, D. J.		Car 1I7
Robinson, S. B. & Gillespie, D. J.		Car 1I8
Robinson, S. B. & Gillespie, D. J.		Car 1I9
Robinson, S. B. & Gillespie, D. J.		Car 1I12
Robinson, S. B. & Gillespie, D. J.		Car 1I13
Robinson, S. B. & Gillespie, D. J.		Car 1J6
Robinson, S. B. & Gillespie, D. J.		Car 1J9
Robinson, S. B. & Gillespie, D. J.		Car 1J11
Robinson, S. B. & Gillespie, D. J.		Car 1J12
Robinson, S. B. & Gillespie, D. J.		Car 1J13
Robinson, S. B. & Gillespie, D. J.		Car 1J14
Robinson, S. B. & Gillespie, D. J.		Car 1J18
Rogers-Hartman		Bur 9 O 34
Rogers-Hartman		Bur 9 O 35
Rogers-Hartman		Bur 9 O 44
Rogers-Hartman		Bur 9 O 51
Rogers-Hartman		Bur 9 O 52
Romain		Bur 9N38
Rowe, J. ?		Car 2J10
Roy	1	Car 7D24

S

St. Michaels Home Farm		Car 5G12
St. Michaels Home Farm		Car 6F7
Sauters, J. D.	1	Car 8A30
Sauters, J. D.	2	Car 8A26
Sauters, J. D.	3	Car 8A40
Sauters, J. D. ?	4	Car 8A41
Sauters, J. D.	5	Car 8A22
Sauters, J. D.	6	Car 8A27
Sauters, J. D.		Car 8A25
Sauters, J. D.		Car 8A29
Sauters, J. D.		Car 8A31
Sauters, J. D.		Car 8A34
Sauters, J. D.		Car 8A37
Sauters, J. D. (Rend)	1	Car 10A23
Sauters, J. D. (Rend)	2	Car 10A14
Sauters, J. D. (Rend)	3	Car 10B20
Sauters, J. D. (Rend)	4	Car 10A28
Sauters, J. D. (Rend)	5	Car 10A26
Sauters, J. D. (Rend)	6	Car 10B25
Sauters, J. D. (Rend)	7	Car 10A31
Sauters, J. D. (Rend)	8	Car 10A30
Sauters, J. D. (Rend)	9	Car 10A35
Sauters, J. D. (Rend)	10	Car 10A15
Sauters & Patterson		Car 8A65
Sauters & Patterson		Car 8A66
Sauters & Patterson		Car 8A67
Sauters & Patterson		Car 8A68
Sauters & Patterson		Car 8B75
Sauters & Patterson		Car 9A4
School Lot		Car 11A95
School Lot		Car 11B50
Schmidt Heirs, John		Car 2G5
Scott, Annie M.	1	Car 11A6
Scott, Annie M.	2	Car 11A14
Scott, Annie M.	3	Car 11A7
Scott, Annie M.	4	Car 11A13
Scott, Annie M.	5	Car 11A12
Scott, Annie M.	6	Bur 11 O 13
Scott, Dr.	1	Car 12A24
Scott, Dr.	2	Car 12B30
Scott, J. L.	1	Car 11A21
Scott, J. L.	5	Car 11A30
Scott, J. L.		Car 11A34
Scott, J. L.		Car 11A38
Scott, J. L.		Car 11A48
Scott, J. P.	1	Car 10A39
Scott, J. P.	2	Car 4G30
Scott, J. P.	2	Car 10B36
Scott, J. P.	3	Car 4G34
Scott, J. P.	3	Car 10B39
Scott, J. P.	4	Car 4G31
Scott, J. P.	4	Car 10B27
Scott, J. P.	5	Car 11B1
Scott, J. P.	6	Car 10B26
Scott, J. P.	8	Car 11A37
Scott, J. P.	9	Car 10B21
Scott, J. P.	10	Car 10B28
Scott, J. P.	11	Car 11B3
Scott, J. P.	12	Car 10B30
Scott, J. P.	13	Car 10B35
Scott, J. P.	14	Car 11B5
Scott, J. P.	15	Car 11B4
Scott, J. P.	16	Car 10A47
Scott, J. P.	17	Car 11A9
Scott, J. P.	18	Car 11A8
Scott, J. P.	19	Car 11B9
Scott, J. P.	20	Car 10B34
Scott, J. P.	21	Car 10B38
Scott, J. P.	22	Car 11A11
Scott, J. P.	23	Car 10B43
Scott, J. P.		Car 4G32
Scott, J. P.		Car 4G35
Scott, J. P.		Car 11A24
Scott, James	1	Bur 10 O 34
Scott, James	2	Bur 10 O 36
Scott, James	3	Bur 10 O 35
Scott, James	4	Bur 10 O 39
Scott, James	5 or 12	Bur 10 O 42
Scott, James	6	Bur 10 O 43
Scott, James	7	Bur 11 O 5
Scott, James	8	Bur 11 O 4
Scott, James	9	Bur 11 O 6
Scott, James	10	Bur 10 O 38
Scott, James	11	Bur 11 O 7
Scott, James	12 or 5	Bur 10 O 40
Scott, James	14	Bur 11 O 1
Scott, James	15	Bur 10 O 41
Scott, John, Jr.	1	Bur 11 O 18

Scott, John, Jr.	2	Car 11A29
Scott Heirs, John	1	Bur 10 O 30
Scott Heirs, John	2	Bur 10 O 31
Scott Heirs, John	3	Bur 10 O 28
Scott Heirs, John	5	Bur 10 O 23
Scott Heirs, John		Car 3E1
Scott Heirs, John		Car 3E2
Scott Heirs, John		Bur 10 O 26
Scott Heirs, John		Bur 10 O 32
Scott, Samuel	1	Car 4F7
Scott, Samuel	2	Car 4F5
Scott, Samuel	3	Car 4F3
Scott, Samuel	4	Car 4F1
Scott, Samuel	5	Car 3F9
Scott, Samuel	6	Car 3F8
Scott, Samuel	7	Car 3F7
Scott, Samuel	8	Car 3F11
Scott, Samuel	9	Car 3F6
Scott, Samuel	10	Car 3F4
Scott, Samuel		Car 3F3
Scott, Samuel		Car 3F10
Scott, Samuel		Car 4G1
Scott, Samuel		Car 4F8
Seabright, John		Car 9K3
Shaffer, Henry	1	Car 5E8
Shaffer, Henry	2	Car 5E4
Shaffer, Henry	3	Car 4E27
Shaffer, Henry	4	Car 5E5
Shaffer, Henry		Car 4E25
Shaffer, Henry		Car 4E26
Shaffer, Henry		Car 4E31
Shaffer, Henry		Car 4E32
Shaffer, Henry		Car 4F39
Shaffer, Henry		Car 4F45
Shaffer, Henry		Car 5E1
Shaffer, Henry		Car 5E2
Shaffer, Henry		Car 5E6
Shaffer, Henry		Car 5E7
Shaffer, Henry		Car 5E9
Shaffer, Leonard	1	Car 5E21
Shaffer, Leonard	5	Car 5E15
Shaffer, Leonard	7	Car 5E18
Shaffer, Leonard		Car 4F49
Shaffer, Leonard		Car 4G25
Shaffer, Leonard		Car 4G26
Shaffer, Leonard (Nichols, J. C.)		Car 4H5
Shaffer, Leonard		Car 5E14
Shaffer, Leonard		Car 5E17
Shaffer, Leonard		Car 5F11
Shaffer, Leonard		Car 5F20
Shaffer, Leonard		Car 5F21
Shaffer, Leonard		Car 5F26
Shaffer, Leonard		Car 5F29
Shaffer		Car 5F46
Shaffer		Car 5F48
Shaffer		Car 5F49
Shaffer		Car 5F51
Shaffer		Car 5F52
Shaffer		Car 5F53
Shane, Andrew	1	Car 8C60
Shane, Andrew	2 or 5	Car 9C13
Shane, Andrew	3 or 2 or5	Car 9C7
Shane, Andrew	4	Car 9C20
Shane, Andrew	5 or 3	Car 9C8
Shane, Andrew	6 or 2	Car 9C14
Shane, Andrew	7	Car 9C18
Shane, Andrew	8 or 4	Car 9C9
Shane, Andrew	9	Car 9C3
Shane Bros. (Ciaffoni, Paul)	1	Car 10C10
Shane Bros. (Ciaffoni, Paul)	2	Car 10C1
Shane Bros. (Ciaffoni, Paul)	3	Car 10C12
Shane Bros. (Ciaffoni, Paul)	4	Car 10C7
Shane Bros. (Ciaffoni, Paul)	5	Car 9C49
Shane Bros. (Ciaffoni, Paul)	8	Car 10C11
Shane Bros.	9	Car 10C20
Shane Bros. (Ciaffoni, Paul)	10	Car 10C16
Shane Bros.	11	Car 10C25
Shane Bros.	12	Car 10C21
Shane Bros.	13	Car 10C36
Shane Bros.	14	Car 10C39
Shane Bros.	15	Car 10C30
Shane Bros.		Car 9C42
Shane Bros. (Ciaffoni, Paul)		Car 10C2
Shane Bros. (Ciaffoni, Paul)		Car 10C5
Shane Bros. (Ciaffoni, Paul)		Car 10C15
Shane, Kate	1	Car 8D16
Shane, Kate	2	Car 9D6
Shane, Kate	3	Car 9D2
Shane, Kate ?		Car 9D9
Shane, John P.		Car 9D3
Shane, John P.		Car 9D4
Shane, John P.		Car 9D5
Shane, John P.		Car 9D10
Shappacher, Charles		Car 3I11
Shaw, D.?		Car 1I10
Shaw, D.		Car 1I20
Shaw, D.		Car 1J19
Short lot	1	Car 8A43
Simington	1	Bur 10K1
Simpson ?		Car 6D5
Slater, J. G.	1	Car 8D21
Slater, J. G.	2	Car 9E4
Slater, J. G.		Car 8D20
Slater, J. G.		Car 8E19
Slater, J. G.		Car 9E1
Smith, C. A.		Bur 8N6
Smith, John		Car 2H10
Smith, John		Car 2H13
Smith, John		Car 2H18
Sollinger, E.	14?	Car 3I20
Speer, A. B.	2?	Car 1I26
Speer, A. B.		Car 1I27
Speer, A. B.		Car 1I29
Speer, E. K.		Car 2H15
Speer, E. K.		Car 2I2
Speer, E. K.		Car 2I5
Speer, E. K.		Car 2I6
Speer, E. K.		Car 2I15
Speer, G. A.		Car 2I1
Speer, I. N.		Car 2H5
Speers, Sarah	1	Car 1J33
Speers, Sarah	2	Car 1J32
Speers, Sarah		Car 1J35
Speers, Sarah		Car 1J36
Springer, L. E.	1	Car 10B13
Springer, L. E.	2	Car 10B22
Springer, L. E.	3	Car 10B24
Springer, L. E.	4	Car 10B19
Springer, L. E.	5	Car 10B16
Sproul, A. H.		Car 1J29
Sproul, Arch.	1	Car 7D36
Sproul, Arch.	2	Car 7D39
Steimler, Fred		Car 2H3
Steinmitter, C.		Car 1H14
Steinmitter, C.		Car 1H22
Sterling, Hugh (A. R. Hamilton)	1	Car 12A16
Sterling, Hugh	3	Car 7D47
Sterling, Hugh	4	Car 7D44
Sterling, Hugh	6	Car 8E5
Sterling, Hugh	8	Car 7D49
Sterling, Hugh	9	Car 8D2
Sterling, Hugh		Car 8D4
Sterling, Hugh		Car 8D5
Sterling, Hugh		Car 8D6
Sterling, Hugh		Car 8E14
Sterling, Hugh (Burgan, A. M. J.)		Car 12A4
Sterling, Hugh (Burgan, A. M. J.)		Car 12A5
Sterling, Hugh (Burgan, A. M. J.)		Car 12A8
Sterling, Hugh (Burgan, A. M. J.)		Car 12A12
Stewart, Jane	1	Car 5E36
Stewart, Jane	2	Car 5E33
Stewart, Jane	3	Car 5E34

Stewart, Samuel	1	Car 4E3
Stewart, Samuel	2	Car 4E4
Stewart, Samuel		Car 4E2
Stilley, Mrs. G.		Bur 8N4
Stilley, J. M.	1 (33A)	Bur 10 O 10
Stilley, J. M.	2	Car 10A9
Stilley, J. M.	3 (33A)	Bur 10 O 12
Stilley, J. M.	4	Bur 9 O 71
Stilley, J. M.	5	Bur 9 O 60
Stilley, J. M.	6	Bur 9 O 59
Stilley, J. M.	7	Bur 9 O 61
Stilley, J. M.	8	Bur 9 O 62
Stilley, J. M.	9	Bur 9 O 66
Stilley, J. M.	10	Bur 9 O 63
Stilley, J. M.	11	Bur 9 O 73
Stilley, J. M.	12	Bur 9 O 64
Stilley, J. M.	13	Bur 10 O 4
Stilley, J. M.	14	Bur 10 O 8
Stilley, J. M.	15	Bur 10 O 13
Stilley, J. M.	16	Bur 9 O 72
Stilley, J. M.	17	Bur 9 O 69
Stilley, J. M.		Bur 9 O 67
Stilley, J. M.		Bur 9 O 68
Stonesipher, John	1	Car 4E5
Stonesipher, John		Car 4E16
Strain, J. (Swain)		Bur 9N37
Sturgeon, James	1	Car 6E15
Sturgeon, James (Young Bros.)	1	Car 6E21
Sturgeon, James	2	Car 6D10
Sturgeon, James	3	Car 6D15
Sturgeon, James	4	Car 6E23
Sturgeon, S. H.	1	Car 6E30
Sturgeon, S. H.	2	Car 6E32
Sturgeon, S. H.	3	Car 6E37
Sturgeon, Sam	2	Car 7B41
Sturgeon, Sam	3?	Car 7B46
Sturgeon, Sam	5	Car 8B5
Sturgeon, Sam	14	Car 8B18
Sturgeon, Sam		Car 7B40
Sturgeon, Sam		Car 8B11
Sturgeon, Sam		Car 8B16
Sturgeon, Sam		Car 8C16
Sturgeon, Sam		Car 8C17
Sturgeon Heirs	4	Car 7A25
Sturgeon Heirs	4	Car 8A6
Sturgeon Heirs	8	Car 7B30
Sturgeon Heirs		Car 7A28
Sturgeon Heirs		Car 7A29
Sudicum, George	1	Car 7D13
Sweet, L. S.		Car 3I23
Sweet, L. S.		Car 3I24
Sweet, L. S.		Car 3J7

T

Taylor, J. S.	1	Car 5F54
Taylor, J. S.	2	Car 5F55
Taylor, Thomas G.	1	Bur 9N18
Taylor, Thomas G.	2	Bur 9N16
Taylor, Thomas G.	4	Bur 9N10
Taylor, Thomas	5	Bur 9M2
Taylor, Thomas G.	6	Bur 9N7
Taylor, Thomas G.	7	Bur 9N11
Taylor, Thomas		Bur 9M1
Taylor & Robbins	2	Bur 9M5
Taylor & Robbins		Bur 9M4
Taylor & Robbins		Bur 9M7
Taylor & Robbins		Bur 9M8
Taylor & Robbins		Bur 9M9
Tidball, A.		Car 4G37
Tidball, A.		Car 4G39
Tidball, A.		Car 4G40
Torrence, A.	1	Car 4E10
Torrence, A.	2	Car 4E9
Torrence, A.	3	Car 4E12
Troutman, George		Car 4D1

U

U. P. Church		Car 4G15
Upcraft, T. M.	1	Car 12B10
Upcraft, T. M.	2	Car 12B12
Upcraft, T. M.	3	Car 12B17
Upcraft, T. M.	4	Car 12B23
Upcraft, T. M.	5	Car 12B14
Upcraft, T. M.	6	Car 12B15

V

Vanderbosh		Bur 9N39
Venice U.P. Church	1	Car 11B57

W

Wacker, P.	1	Car 7C16
Wade-Ewer et al.	1	Car 9B20
Wade-Ewer et al.	1	Car 9B32
Wade-Ewer et al.	2	Car 9B29
Wade-Ewer et al.	3	Car 9A43
Wade-Ewer et al.	3	Car 9B35
Wade-Ewer et al.	4?	Car 9B26
Wade-Ewer et al.	5	Car 9B42
Wade-Ewer et al.	6?	Car 9B40
Wade-Ewer et al.		Car 9A6
Wade-Ewer et al.		Car 9A7
Wade-Ewer et al.		Car 9A11
Wade-Ewer et al.		Car 9A18
Wade-Ewer et al.		Car 9A21
Wade-Ewer et al.		Car 9A22
Wade-Ewer et al.		Car 9A26
Wade-Ewer et al.		Car 9A36
Wade-Ewer et al.		Car 9A37
Wade-Ewer et al.		Car 9A41
Wade-Ewer et al.		Car 9B5
Wade-Ewer et al.		Car 9B41
Walker, Gabriel		Car 6B11
Walker, J.	1	Car 5E44
Walker, J.	2	Car 5E48
Walker, J. D.	1	Car 9D26
Walker, J. D.		Car 9D21
Walker, J. E.		Car 6F9
Walker, Josiah	3	Car 6B9
Walker, Josiah	4	Car 6B10
Walker, T. W.		Car 11B33
Walker, T. W.		Car 11B35
Walker, T. W.		Car 11B36
Walker, T. W.		Car 11B37
Walker, T. W.		Car 11B38
Walker Heirs	1	Car 6C2
Walker Heirs (Miller)	1	Car 7C34
Walker Heirs (Greenfield)	2	Car 5C19
Walker Heirs	3	Car 5C18
Walker Heirs (Greenfield)	4	Car 5C24
Wallace, Charles		Car 12C1
Wallace, James	2	Car 7B16
Wallace, James	3	Car 7B21
Wallace, James	4	Car 7B26
Wallace, James	5	Car 7B12
Wallace, James	6	Car 7B36
Wallace, James	9	Car 7B28
Wallace, James		Car 7B29
Wallace, James		Bur 7N7
Wallace, James		Bur 8N1
Wallace, James		Bur 8N2
Wallace, James		Bur 8N3
Wallace, Robert	1	Car 8D10
Wallace, Robert	2	Car 8D9
Wallace, Robert	3	Car 8D13
Wallace, Robert	4	Car 8D12
Wallace Heirs	1	Car 7B10
Wallace Heirs	1	Car 9B2
Wallace Heirs	3	Car 9B6
Wallace Heirs	4	Car 8B74
Wallace Heirs	5	Car 8B76
Wallace Heirs	6	Car 8C46
Wallace Heirs	7	Car 9C15
Wallace Heirs	8	Car 8C51
Wallace Heirs	9	Car 9B15
Wallace Heirs	10	Car 8C54
Wallace Heirs	11 or 12	Car 9C4
Wallace Heirs	12 or 11	Car 9C1

Wallace Heirs	13	Car 9C10
Wallace Heirs	14	Car 8C58
Wallace Heirs	15	Car 8B77
Wallace Heirs	16	Car 9B11
Wallace & Miller	1	Car 9B3
Wallace & Miller	2	Car 9B4
Wallace & Miller	3	Car 9B1
Wallace & Miller	4	Car 9B8
Wallace & Miller	5	Car 9B12
Wallace & Miller	6	Car 9B9
Wallace & Miller	7	Car 9B13
Wallace & Miller	8	Car 9B7
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Watters, Henry		Car 8E2
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Welsh, D. W. (Cemetery Lot)		Bur 9M21
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Wettengale, George	3	Car 3I36
Wettengale, George	4	Car 4J1
Wettengale, George		Car 3J10
Wettengale, George		Car 3I44
Wettengale, George		Car 419
Wettengel, A. C.	1	Car 6D20
Wettengel, A. C.	4	Car 7D10
Wettengel, A. C.	9	Car 7D2
Wettengel, A. C.	12	Car 7D7
Wettengel, A. C.		Car 6C50
Wettengel, A. C.		Car 6C51
Wettengel, A. C.		Car 6D30
Wettengel, Annie C.	1	Car 6B1
Wettengel, Annie C.	2	Car 5B3
Wettengel, George	1	Car 7B6
Wettengel, George	2	Car 7B9
Wettengel, George	8	Car 7B3
Wettengel, George		Car 6B17
Wettengel, George		Car 7A1
Wettengel, George		Car 7B1
Wettengel, George		Car 7B11
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White, J.		Car 12B37
White, J.		Car 13B2
Whitmore, H. H.	1?	Car 5C11
Whitmore, H. H.	2	Car 5C15
Whitmore, H. H.	5?	Car 5C20
Whitmore, H. H.		Car 5C7
Whitmore, H. H.		Car 5C8
Whitmore, H. H.		Car 5C16
Whitmore, H. H.		Car 5C17
Whitmore, J. F.		Car 5C21
Whitmore, John	3	Car 5C25
Whitmore, John	6	Car 6C10
Whitmore, John	7	Car 6C9
Whitmore, John		Car 6C4
Whitmore, John		Car 6C8
Whitmore, Samuel	1?	Car 5C14
Whitmore, Samuel	2	Car 5C6
Whitmore, Samuel		Car 5C2
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Whitmore, Samuel		Car 5C9
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Willow Grove Mining Co.	1	Car 8B42
Willow Grove Mining Co.		Car 8B25
Willow Grove Mining Co.	1?	Car 8B32
Willow Grove Mining Co.		Car 8B37
Willow Grove Mining Co.		Car 8B43
Willow Grove Mining Co.		Car 8B47
Willow Grove Mining Co.		Car 8B48
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Wilson, Isabel		Car 1I11
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Wilson, R.		Car 8C38
Woods, W. F.	1	Car 9B16
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Woods, W. F.	4	Car 9B27
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Woods, W. F.	6	Car 9B17
Woods, W. F.	7	Car 9B18
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Wood, et al.		Car 7F2
Wood, et al.		Car 7F3
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Wright Heirs, Thomas	3	Car 5E16
Wright Heirs, Thomas	4	Car 5E28
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Magnus Heirs, P. J.	5?	1H7
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Magnus Heirs, P. J.	6	1H9
Magnus Heirs, P. J.	2	1H10
Magnus Heirs, P. J.		1H11
Magnus Heirs, P. J.		1H12
Magnus Heirs, P. J.	3	1H13
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Robinson, S. B. & Gillespie, D. J.		1I9
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McCurdy, J. J.	7	4F27
McGarr, J. E. (J. L.)	2	4F28
Adams-Linton Heirs	2	4F29
Adams-Linton Heirs	3	4F30
McCurdy, J. J.	1	4F31
Linton, Samuel		4F32
Linton, Samuel		4F33
Burrows, W. W.	4	4F34
McCurdy, J. J.	9	4F35
Burrows, W. W.	3	4F36
McCurdy, J. J.	11	4F37
Linton, Samuel		4F38
Shaffer, Henry		4F39
Kelso		4F40
Kelso	12	4F41
Burrows, W. W.	2	4F42
McCurdy, J. J.		4F43
McCurdy, J. J.	8	4F44
Shaffer, Henry		4F45
Kelso		4F46
Kelso		4F47
Kelso		4F48
Shaffer, Leonard		4F49
Kelso		4F50
Kelso		4F51
Kelso	2	4F52
Kelso	4	4F53
Scott, Samuel L.		4G1
Riddle, Jane		4G2
Riddle, Jane		4G3
Riddle, Jane		4G4
McCormick, B. H.		4G5
Riddle, J. W.	1	4G6
McCormick, B.	2	4G7
Riddle, J. W.	3	4G8
Riddle, Jane		4G9
Riddle, Jane		4G10
Riddle, W. E.		4G11
Riddle, W. E.		4G12
Riddle, J. W.	2?	4G13
McCormick, B. H.	1	4G14
U. P. Church		4G15
Parsonage		4G16
Parsonage		4G17
Daugherty, W. H. (H. H.)	2	4G18
Daugherty, W. H. (H. H.)	3	4G19
Riddle, W. E.		4G20
Adams, John J.	1	4G21
Adams, John J.	3	4G22
McCurdy, J. J.	3	4G23
Adams, J. J.		4G24
Shaffer, Leonard		4G25
Shaffer, Leonard		4G26
McCurdy, J. J.	4	4G27
Adams, John J.	2	4G28
Daugherty, W. H. (H. H.)	1?	4G29
Scott, J. P.	2	4G30
Scott, J. P.	4	4G31
Scott, J. P.		4G32
McCurdy, J. J.	6	4G33
Scott, J. P.	3	4G34
Scott, J. P.		4G35
McCurdy, J. J.	5	4G36
Tidball, A.		4G37
Glass, A.		4G38
Tidball, A.		4G39
Tidball, A.		4G40
Orris, James		4G41
Nichols, James	4	4H1
Borchett, Dr.		4H2
Nichols, James	2	4H3
Borchett, Dr.	4	4H4
Shaffer, Leonard (Nichols, J. C.)		4H5
Hack, George		4H6
Brimm, F.		4H7
Petrie, William	5	4I1
Pittsburgh Coal Co.		4I2
Petrie, William	1?	4I3
Petrie, William	3	4I4
Moss, Mary		4I5
Pittsburgh Coal Co.		4I6
Petrie, William	2	4I7
Petrie, William	1	4I8
Wettengale, George		4I9
Petrie, William		4I10
Hetzler, P		4I11
Hetzler, P		4I12
Lear, Robert		4I13
Pittsburgh Coal Co.		4I14
Wettengale	4	4J1
Pennsylvania Railroad		4J2
Pennsylvania Railroad		4J3
Fortwangle Estate	1	4J4
Pennsylvania Railroad		4J5
Davis, George		4J6
Davis, George		4J7
Fortwangle Estate	2	4J8
Davis, George		4J9
Davis, George		4J10
Davis, George		4J11
Pittsburgh Coal Co.		4J12
McBride Estate	1	4J13
McBride Estate	2	4J14
Pittsburgh Coal Co.		4J15
McBride Estate		4J16
McBride Estate		4J17
McBride Estate	3	4J18
McDermott, John		4J19
Morrow, John	3	5B1
Robb Heirs	2	5B2
Wettengel, Annie C.	2	5B3
Wilson, Mary		5C1
Whitmore, Samuel		5C2
Clark, William H.		5C3
Robb, John		5C4
Whitmore, Samuel		5C5
Whitmore, Samuel	2	5C6
Whitmore, H. H.		5C7
Whitmore, H. H.		5C8
Whitmore, Samuel		5C9
Whitmore, Samuel (Potter, Cyrus)		5C10
Whitmore, H. H.	1?	5C11
Morrow, John	2	5C12
Morrow, John		5C13
Whitmore, Samuel	1?	5C14
Whitmore, H. H.	2	5C15
Whitmore, H. H.		5C16
Whitmore, H. H.		5C17
Walker Heirs	3	5C18
Walker Heirs (Greenfield)	2	5C19
Whitmore, H. H.	5?	5C20
Whitmore, J. F.		5C21
Robb, John		5C22
Robb Heirs	1	5C23
Walker Heirs (Greenfield)	4	5C24
Whitmore, John	3	5C25
Bell, Nancy	1?	5C26
Gormley, James	4	5C27
Clark, J. D. (Smith Co.)		5C28
Lutz, John	1	5D1
Campbell, Scott		5D2
Lutz, John		5D3
Robb, John (Smith Co.)		5D4
Robb, John (Smith Co.)		5D5

Robb, John (Smith Co.)		5D6
Campbell, Scott		5D7
McMurray, Joseph	5	5D8
McMurray, Joseph	6	5D9
Campbell, Scott		5D10
Clark, J. D.		5D11
Clark, J. D.		5D12
McMurray, Joseph	7	5D13
McMurray, Joseph	3	5D14
Clark, J. D.	2	5D15
McMurray, Joseph	8	5D16
Clark, J. D.		5D17
Mathews-Ewing	2	5D18
Mathews-Ewing	3	5D19
McMurray, G. & W.		5D20
Shaffer, Henry		5E1
Shaffer, Henry		5E2
McMichael, J. R.	3	5E3
Shaffer, Henry	2	5E4
Shaffer, Henry	4	5E5
Shaffer, Henry		5E6
Shaffer, Henry		5E7
Shaffer, Henry	1	5E8
Shaffer, Henry		5E9
McMichael, J. R.	1	5E10
McGregor, Mrs.		5E11
McMichael, J. R.	2	5E12
Wright Heirs, Thomas		5E13
Shaffer, Leonard		5E14
Shaffer, Leonard	5	5E15
Wright Heirs, Thomas	3	5E16
Shaffer, Leonard		5E17
Shaffer, Leonard	7	5E18
Wright, Martha	1	5E19
Wright Heirs, Thomas		5E20
Shaffer, Leonard	1	5E21
Campbell, Scott		5E22
Wright Heirs, Thomas	6	5E23
Wright Heirs, Thomas		5E24
Wright Heirs, Thomas		5E25
Wright Heirs, Thomas	2	5E26
Moore, H. P.	1	5E27
Wright Heirs, Thomas	4	5E28
Campbell, Scott	1	5E29
Campbell, W. J.		5E30
Campbell, W. J.	3	5E31
Moore, J. S.	1	5E32
Stewart, Jane	2	5E33
Stewart, Jane	3	5E34
Campbell, W. J.		5E35
Stewart, Jane	1	5E36
McGregor, Matthew	1?	5E37
Campbell, W. J.		5E38
McHenry, M. E.		5E39
Moore, J. A.		5E40
Moore, J. A.		5E41
McMurray, Joseph	4	5E42
McGregor, Matthew	1	5E43
Walker, J.	1	5E44
Moore, J. A.		5E45
McGregor, Matthew	2	5E46
Ewing, J. N.	2	5E47
Walker, J.	2	5E48
Ewing, J. N.	3	5E49
McGill, Jane		5E50
Ewing, J. N.	1	5E51
Ewing, J. N.	7	5E52
Ewing, J. N.	4	5E53
Ewing, J. N.	6	5E54
McGill, Jane	1	5E55
McGill, Jane	6	5E56
Kelso	4?	5F1
Neely Heirs, John M.		5F2
Kelso		5F3
Pittsburgh Coal Co.	1	5F4
Neely Heirs, John M.	3	5F5
Pittsburgh Coal Co.	3	5F6
Cowan, J.		5F7
Pittsburgh Coal Co.	2	5F8
Cowan, J.		5F9
Pittsburgh Coal Co.	4	5F10
Shaffer, Leonard		5F11
Neely Heirs, John M.	4	5F12
Pittsburgh Coal Co.	2?	5F13
Pittsburgh Coal Co.	3	5F14
Pittsburgh Coal Co.	5	5F15
Cowan, J.		5F16
Mertz, A. F.		5F17
Mertz, A. F.		5F18
Mertz, A. F.		5F19
Shaffer, Leonard		5F20
Shaffer, Leonard		5F21
Neely Heirs, John M.		5F22
Neely Heirs, John M	5	5F23
Pittsburgh Coal Co.	1	5F24
Mertz, A. F.	1?	5F25
Shaffer, Leonard		5F26
Neely Heirs, John M.	5?	5F27
Pittsburgh Coal Co.		5F28
Shaffer, Leonard		5F29
Neely Heirs, John M.		5F30
Neely Heirs, John M.	2	5F31
Neely Heirs, John M.	6	5F32
McMillan, Isaac	1?	5F33
McMillan, Isaac		5F34
Kelso, Louisa	1?	5F35
Kelso, Louisa	2	5F36
McMillan, Isaac		5F37
McMillan, Isaac		5F38
McMillan, Isaac		5F39
Kelso, Louisa		5F40
Kelso, Louisa		5F41
McMillan, Isaac		5F42
Real Estate	1	5F43
Mertz		5F44
Real Estate	3	5F45
Shaffer		5F46
Real Estate	2	5F47
Shaffer		5F48
Shaffer		5F49
Wyble, J. E. ?		5F50
Shaffer		5F51
Shaffer		5F52
Shaffer		5F53
Taylor, J. S.	1	5F54
Taylor, J. S.	2	5F55
Wyble, J. E.		5F56
Wyble, J. E.		5F57
Wyble, J. E.		5F58
Wright, Wilbur		5F59
Cowan, J.	4	5G1
Geiser, M.		5G2
Cowan, J.		5G3
Cowan, J.		5G4
Geiser, M.		5G5
Geiser, M.		5G6
Pittsburgh Coal Co.		5G7
Pittsburgh Coal Co.		5G8
McMichael Heirs, Isaac	1	5G9
McMichael Heirs, Isaac	3	5G10
McMichael Heirs, Isaac	2	5G11
St. Michaels Home Farm		5G12
McElhenny, E. S.		6A1
Noble Heirs, William		6A2
McElhenny, E. S.		6A3
Noble Heirs, William	1	6A4
Noble Heirs, William	2	6A5
Noble Heirs, William		6A6
Noble Heirs, William		6A7
Noble Heirs, William		6A8
McKee, Boyle		6A9
Fisher, Robert M.	1	6A10
Wettengel, Annie C.	1	6B1
Gormley, James	22	6B2
Gormley, James	21	6B3
Fife, J. M.		6B4
McElhenny, E. S. ?		6B5

Fife, J. M.		6B6
Hutchinson, F. A.		6B7
McElhenny, E. S.		6B8
Walker, Josiah	3	6B9
Walker, Josiah	4	6B10
Walker, Gabriel		6B11
McElhenny, E. S.		6B12
Hutchinson, F. A.		6B13
McElhenny, E. S.		6B14
Hutchinson, F. A.	1	6B15
Mathews Heirs	2	6B16
Wettengel, George		6B17
Baldwin, George		6B18
Baldwin, George	3	6B19
Gormley, James	3	6C1
Walker Heirs	1	6C2
Clark, James	1	6C3
Whitmore, John		6C4
Gormley, James	5	6C5
Gormley, James	20	6C6
Gormley, James	12	6C7
Whitmore, John		6C8
Whitmore, John	7	6C9
Whitmore, John	6	6C10
Gormley, James	9	6C11
Gormley, James	11	6C12
Bell, Abram	7	6C13
Mathews-Ewing	1	6C14
Gormley, James	8	6C15
Gormley, James		6C16
Gormley, James	17	6C17
Gormley, James	10	6C18
Gormley, James		6C19
Gormley, James	7	6C20
Gormley, James	15	6C21
Gormley, James	1	6C22
Bell, Abram	8	6C23
Mathews Heirs	7	6C24
Gormley, James	6	6C25
Gormley, James	19	6C26
Bell, Abram	10	6C27
Mathews Heirs	6	6C28
Gormley, James	14	6C29
Gormley, James	2	6C30
Bell, Abram	11	6C31
Mathews, J. J.	7	6C32
Mathews Heirs	5	6C33
Mathews, J. J.	6	6C34
Mathews, J. J.	8	6C35
Mathews, J. J.	5	6C36
Mathews Heirs	9	6C37
Mathews Heirs	3	6C38
Mathews Heirs	8	6C39
Bell, Abram	6	6C40
Bell, Abram	9	6C41
Bell, Abram	4	6C42
Mathews, J. J.	3	6C43
Mathews, J. J.	2	6C44
Mathews Heirs	1	6C45
Bell, Abram	2	6C46
Bell, Abram	5	6C47
Herron, J. B.	6	6C48
Herron, J. B.	1	6C49
Wettengel, A. C.		6C50
Wettengel, A. C.		6C51
Mathews, J. J.	1	6C52
Bell, Abram	3	6C53
Herron, J. B.	2	6C54
Herron, J. B.	3	6C55
Herron, J. B.	9	6C56
Bell, Abram	1	6C57
Connell Heirs (Hogan)		6C58
Mathews-Ewing		6D1
Gamble, Thomas (Gamble)	1	6D2
McMurray, G. & W.		6D3
Gamble, Thomas (Gamble)	5	6D4
Simpson ?		6D5
Gamble, Thomas (Gamble)	6	6D6
Gamble, Thomas (Tidal)	6	6D7
Gamble, Thomas (Tidal)	1	6D8
Gamble, Thomas (Tidal)	2	6D9
Sturgeon, James	2	6D10
Bailey, E.		6D11
Bailey, E.		6D12
Black, J. A.	3	6D13
Gamble, Thomas (Tidal)		6D14
Sturgeon, James	3	6D15
Black, J. A.	2	6D16
Kennedy, George		6D17
Bailey, E.		6D18
Bean Plan ?		6D19
Wettengel, A. C.	1	6D20
Kennedy, George		6D21
Kennedy, George		6D22
Oakdale, Town of		6D23
Kennedy, George		6D24
Kennedy, George		6D25
Oakdale, Town of		6D26
O'Connell, Thomas	3	6D27
Oakdale, Town of		6D28
Oakdale, Town of		6D29
Wettengel, A. C.		6D30
Guy, J. W.	2	6D31
McGill, W. J.	4	6E1
Ewing, J. N.	5	6E2
Mevey, S. J.	1	6E3
McGill, W. J.		6E4
McMurray, G. & W.		6E5
McGill, W. J.	1	6E6
McGill, Jane	3	6E7
McGill, W. J.	8	6E8
McMurray, G. & W.	2	6E9
McGill, W. J.	6	6E10
McGill, Jane		6E11
McGill, Jane	5	6E12
Miller & McBride		6E13
McGill, W. J.	9	6E14
Sturgeon, James	1	6E15
Miller & McBride		6E16
McGill, Jane	4	6E17
McGill, W. J.	5	6E18
McGill, Jane	8	6E19
Miller & McBride		6E20
Sturgeon, James (Young Bros.)	1	6E21
McGill, W. J.	7	6E22
Sturgeon, James	4	6E23
Kemp, Agnes	1	6E24
Miller & McBride		6E25
McClelland Heirs	1	6E26
Kemp, Agnes	4	6E27
Miller & McBride		6E28
Kemp, Agnes	3	6E29
Sturgeon, S. H.	1	6E30
McClelland Heirs	2	6E31
Sturgeon, S. H.	2	6E32
Kennedy, George		6E33
Kemp, Agnes	2	6E34
Kennedy, George	2	6E35
McClelland Heirs	6	6E36
Sturgeon, S. H.	3	6E37
Gregg Heirs	2	6E38
Wyble, J. E.		6F1
Ewing, Mary & Williams, Jane		6F2
Ewing, Mary & Williams, Jane		6F3
Ewing, Mary & Williams, Jane		6F4
Ewing, Mary & Williams, Jane		6F5
Ewing, W. P.		6F6

St. Michaels Home Farm		6F7
Gregg Heirs		6F8
Walker, J. E.		6F9
Gregg Heirs	1	6F10
Gregg Heirs	5	6F11
Gregg Heirs		6F12
Gregg Heirs	4	6F13
Gregg	3	6F14
Gregg	1	6F15
Donaldson, E. C.		7M1
Donaldson, Richard	2	7M2
Pittsburgh Coal Co.	2	7N1
Pittsburgh Coal Co.	1	7N2
Crooks, Richard (Lauff)	1	7N3
Crooks, Richard	2	7N4
Donaldson, E. C.		7N5
Donaldson, E. C.		7N6
Wallace, James		7N7
Lauff, Margaret		7O1
Douglas, J. A.	1	7O2
Robb, John S. (Mark)		7O3
Rohb, J. W.	6	7O4
Robb, J. W.		7O5
McAdams, S. J.	1	7O6
Robb, J. W.	3	7O7
Wettengel, George		7A1
Elliott Bros.	8	7A2
Hopper, Samuel	2	7A3
Elliott Bros.	10	7A4
Hopper, Samuel	3	7A5
Elliott Bros.	20	7A6
Elliott Bros.	12	7A7
Elliott Bros.	16	7A8
Elliott Bros.		7A9
Elliott Bros.	14	7A10
Elliott Bros.	19	7A11
Elliott Bros.	11	7A12
Hopper, Samuel	4	7A13
Elliott Bros.	7	7A14
Elliott Bros.	18	7A15
Hopper, Samuel	1	7A16
Elliott Bros.	13	7A17
Elliott Bros.	15	7A18
Elliott Bros.		7A19
Elliott Bros.	9	7A20
Elliott Bros.	17	7A21
Elliott Bros.	6	7A22
Rohb, John S. (Mark)	3	7A23
Elliott Bros.	5	7A24
Sturgeon Heirs	4	7A25
Elliott Bros.	4	7A26
Robb, John S. (Mark)		7A27
Sturgeon Heirs		7A28
Sturgeon Heirs		7A29
Robb, John S. (Mark)		7A30
Rohb, James	4	7A31
Robb, Mary	4	7A32
Elliott Bros.	2	7A33
Wettengel, George		7B1
Baldwin, George W.	1	7B2
Wettengel, George	8	7B3
Herron, W. G. (Susan)	2	7B4
Baldwin, George W.	5	7B5
Wettengel, George	1	7B6
Baldwin, George W.	2	7B7
Herron, W. G. (Susan)	6	7B8
Wettengel, George	2	7B9
Wallace, James	1	7B10
Wettengel, George		7B11
Wallace, James	5	7B12
Morgan Heirs	11	7B13
Herron, W. G. (Susan)	4	7B14
Morgan Heirs	7	7B15
Wallace, James	2	7B16
Morgan Heirs	10	7B17
Morgan Heirs	9	7B18
Morgan Heirs	8	7B19
Morgan Heirs	13	7B20
Wallace, James	3	7B21
Elliott Bros.		7B22
Morgan Heirs	12	7B23
Morgan Heirs	5	7B24
Morgan Heirs	6	7B25
Wallace, James	4	7B26
Elliott Bros.		7B27
Wallace, James	9	7B28
Wallace, James		7B29
Sturgeon Heirs	8	7B30
Elliott Bros.	1	7B31
Morgan Heirs	2	7B32
Morgan Heirs	4	7B33
Morgan Heirs		7B34
Morgan Heirs	3	7B35
Wallace, James	6	7B36
Elliott Bros.	7	7B37
Elliott Bros.		7B38
Mevey, James	20	7B39
Sturgeon, Sam		7B40
Sturgeon, Sam	2	7B41
Glenn, John McD.	1	7B42
Miller, V.	20	7B43
Mevey, James	6	7B44
Mevey, James	19	7B45
Sturgeon, Samuel	3?	7B46
Herron, J. B.	4	7C1
Herron, J. B.	5	7C2
Herron, W. G.	12	7C3
Herron, W. G.	3	7C4
Connell, Robert	7 or 1	7C5
Herron, J. B.	7	7C6
Herron, W. G.	1	7C7
Herron, J. B.	8	7C8
Herron, W. G.	5	7C9
Herron, W. G.	9	7C10
Connell, Robert J.	5	7C11
Herron, W. G.	11	7C12
Herron, W. G.		7C13
Glenn, R. W.	1	7C14
Herron, W. G.	10	7C15
Wacker, P.	1	7C16
Herron, W. G.	8	7C17
Glenn, Etta	1	7C18
Herron, W. G.	2	7C19
Herron, W. G.	7	7C20
Herron, W. G.		7C21
Glenn, R. W.	5	7C22
Herron, W. G. ?		7C23
Herron, W. G. ?		7C24
Herron, W. G. ?		7C25
Marshall, Robert ?		7C26
Marshall, Robert ?		7C27
Glenn, R. W.	3	7C28
Marshall, Robert ?		7C29
Marshall, Robert ?		7C30
Marshall, Robert ?		7C31
Marshall, Robert ?		7C32
Marshall, Robert ?		7C33
Walker Heirs (Miller ?)	1?	7C34
Gillian, James	1	7C35
Mitchell, George	1	7C36
Glenn, J. McD.	3	7C37
Mankedick		7C38
Mankedick		7C39
Mankedick		7C40
Glenn, J. McD.	3 P.I.	7C41
Marshall, Robert	3	7C42
Glenn, J. McD.		7C43

McKiever, James		7D1
Wettengel, A. C.	9	7D2
Guy, J. W.	1	7D3
Oakdale, Town of		7D4
Oakdale, Town of		7D5
Connell, Robert J.		7D6
Wettengel, A. C.	12	7D7
McKiever, James		7D8
Oakdale, Town of		7D9
Wettengel, A. C.	4	7D10
Oakdale, Town of		7D11
McKiever, James	6	7D12
Sudicum, George	1	7D13
Oakdale, Town of		7D14
McMurray, G. & W.	6	7D15
McMurray, G. & W.	4	7D16
Oakdale, Town of		7D17
Oak Ridge Coal Co. ?		7D18
Oakdale, Town of ?		7D19
Freeman		7D20
McMurray, G. & W.	5	7D21
Marshall Heirs, Robert	6	7D22
Pittsburgh National Coal Co.	1	7D23
Roy		7D24
McMurray, G. & W.	3	7D25
Pittsburgh National Coal Co.	2	7D26
McMurray, G. & W.	2	7D27
Marshall Heirs, Robert	5	7D28
McMurray, G. & W.	1	7D29
Gibson		7D30
Hadden, J. A. ?		7D31
Marshall Heirs, Robert	2	7D32
Marshall Heirs, Robert	9	7D33
Hadden, J. A. ?		7D34
Fayette Coal Co. ?	1?	7D35
Sproul, Arch	1	7D36
Oakdale Cemetery	1	7D37
Hadden, J. A. ?		7D38
Sproul, Arch	2	7D39
Marshall Heirs, Robert	10	7D40
Campbell, M.	1	7D41
Durantiar, V.	1	7D42
Fayette Coal Co. ?	5	7D43
Sterling, Hugh	4	7D44
Campbell, M.	2	7D45
Campbell, M.	3	7D46
Sterling, Hugh	3	7D47
Marshall Heirs, Robert	4	7D48
Sterling, Hugh	8	7D49
Kennedy, George		7E1
Gibson, B. M.	1	7E2
McMurray, John	2?	7E3
McMurray, John	2	7E4
McMurray, John	6	7E5
McMurray, John		7E6
Boys Industrial Home		7E7
Watters, Henry		7E8
Wood, et al.		7F1
Wood, et al.		7F2
Wood, et al.		7F3
Nesbit, John W. ?		7F4
Nesbit, E. W.	1	7F5
Nesbit, E. W.	2	7F6
Nesbit ?		7F7
Donaldson, Richard	1	8M1
Dickson, R. M.		8M2
Wallace, James		8N1
Wallace, James		8N2
Wallace, James		8N3
Stilley, Mrs. G.		8N4
Osborne	1	8N5
Smith, C. A.		8N6
McDonald, K. Noble	60	8N7
Reddick ?		8N8
McDonald, K. Noble	63	8N9
McBurney, John R.	13	8N10
McDonald, K. Noble	66	8N11
McDonald, K. Noble		8N12
McDonald, K. Noble	67	8N13
McBurney, John R.	5	8N14
McBurney, John R.	8	8N15
McBurney, John R.	12	8N16
McDonald, K. Noble		8N17
McDonald, K. Noble		8N18
McDonald, K. Noble	59	8N19
McDonald, K. Noble	65	8N20
Redmond, Thomas		8N21
Redmond, Thomas	1?	8N22
Gordon, Joseph	1	8N23
McBurney, John R.	7	8N24
McAdams, J. S.		8O1
McDonald, K. Noble	16	8O2
McDonald, Edward	10	8O3
Robb, Joseph	5	8O4
McDonald, Edward	17	8O5
McDonald, K. Noble		8O6
McDonald, K. Noble	14	8O7
McDonald, Edward	8	8O8
McDonald, Edward		8O9
McDonald, K. Noble	10	8O10
McDonald, K. Noble	68	8O11
McDonald, K. Noble	69	8O12
McDonald, K. Noble	61	8O13
McDonald, Edward	9	8O14
McDonald, K. Noble	8	8O15
McDonald, K. Noble	3	8O16
McDonald, Edward	4	8O17
McDonald, K. Noble	62	8O18
McDonald, Edward	23	8O19
Robb, J. W.	2	8A1
Robb, James	5	8A2
Robb	3	8A3
Robb, Mary	3	8A4
Elliott Bros.	3	8A5
Sturgeon Heirs	4	8A6
Miller, V.		8A7
Fayall, A.	5	8A8
Robb, Joseph	1	8A9
Robb, Mary	2	8A10
Elliott Bros.	1	8A11
Miller, V.	19	8A12
Robb, J. W.	7	8A13
Robb, Joseph	4	8A14
Robb, Mary	1	8A15
Robb	2	8A16
Fayall, A.	2	8A17
Fayall, A.	3	8A18
Miller, V.		8A19
Robb, William S.	1	8A20
Robb	1	8A21
Sauters, J. D.	5	8A22
Fayall, A.	1	8A23
Robb, William S.	2	8A24
Sauters, J. D.		8A25
Sauters, J. D.	2	8A26
Sauters, J. D.	6	8A27
Miller, V.	12	8A28
Sauters, J. D.		8A29
Sauters, J. D.	1	8A30
Sauters, J. D.		8A31
McDonald, Edward	19	8A32
McDonald, Edward	21	8A33
Sauters, J. D.		8A34
McDonald, Edward	25	8A35
McDonald, Edward	2	8A36
Sauters, J. D. ?		8A37
McDonald, Edward	15	8A38
McDonald, Edward	3	8A39
Sauters, J. D.	3	8A40
Sauters, J. D. ?	4	8A41
McDonald, Edward	28	8A42
Short lot	1	8A43
McDonald, Town of		8A44
McDonald, Town of		8A45
McDonald, Town of		8A46
McDonald, Edward	16	8A47
McDonald, Town of		8A48

McDonald, Town of		8A49
McDonald, Town of		8A50
McDonald, Town of		8A51
McDonald, Edward	26	8A52
McDonald, Town of		8A53
McDonald, Town of		8A54
McDonald, Town of		8A55
McDonald, Town of		8A56
McDonald, Town of		8A57
McDonald, Town of		8A58
McDonald, Edward	27	8A59
McDonald, Edward	24	8A60
McDonald, Edward		8A61
McDonald, Edward	7	8A62
Cook, S. H.	1	8A63
Johns, S. S.	1	8A64
Sauters & Patterson		8A65
Sauters & Patterson		8A66
Sauters & Patterson		8A67
Sauters & Patterson		8A68
Mevey, James	8	8B1
Mevey, James	7	8B2
Elliott Bros.	2	8B3
Mevey, James	18	8B4
Sturgeon, Samuel	5	8B5
Glenn, J. McD.	2	8B6
Miller, V.	18	8B7
Mevey, James		8B8
Mevey, James	17	8B9
Mevey, James	31	8B10
Sturgeon, Samuel		8B11
Mevey, James		8B12
Miller, V.	17	8B13
Mevey, James	30	8B14
Mevey, James	29	8B15
Sturgeon, Samuel		8B16
Mevey, James	21	8B17
Sturgeon, Samuel	14	8B18
Mevey, James		8B19
Mevey, James	3	8B20
Mevey, James	28	8B21
Miller, V.		8B22
Miller Heirs	4	8B23
Mevey, James	22	8B24
Willow Grove Mining Co.		8B25
Mevey, James		8B26
Mevey, James		8B27
Miller Heirs	3	8B28
Miller Heirs	11	8B29
Miller Heirs	2	8B30
Mevey, James	27	8B31
Willow Grove Mining Co.		8B32
Miller, V.	14	8B33
Miller, V.		8B34
Miller Heirs	8?	8B35
Mevey, James	23	8B36
Willow Grove Mining Co.	1?	8B37
Miller, V.	16	8B38
Mevey, James	13	8B39
Miller Heirs		8B40
Mevey, James	24	8B41
Willow Grove Mining Co.	1	8B42
Willow Grove Mining Co.		8B43
Miller Heirs	6	8B44
Miller Heirs	5	8B45
Mevey, James		8B46
Willow Grove Mining Co.		8B47
Willow Grove Mining Co.		8B48
Mevey, James	26	8B49
Miller Heirs		8B50
Mevey, James	25	8B51
Mevey, James	5 or 15	8B52
Pittsburgh Coal Co.		8B53
Mevey, James	9	8B54
Miller Heirs		8B55
Miller Heirs	8	8B56
McDonald, Town of		8B57
McDonald, Town of		8B58
Miller Heirs ?	9	8B59
Mevey, James	10	8B60
Mevey, James	14	8B61
Mevey, James		8B62
McDonald, Town of		8B63
McDonald, Town of		8B64
McDonald, Town of		8B65
McDonald, Town of		8B66
Miller Heirs ?		8B67
Miller, W.		8B68
Mevey, James	11	8B69
McDonald, Town of		8B70
Mevey, James	12	8B71
McDonald, Town of		8B72
McDowell, S. S. ?	1	8B73
Wallace Heirs	4	8B74
Sauters & Patterson		8B75
Wallace Heirs	5	8B76
Wallace Heirs	15	8B77
Mankedick, Frank		8C1
Mankedick, Frank		8C2
Mankedick, Frank		8C3
Mankedick		8C4
Mankedick		8C5
Glenn, John McD.	4	8C6
Glenn, J. McD.	1	8C7
Kelso, B. M.	1	8C8
Glenn, John McD.	5	8C9
Mankedick, Frank		8C10
Mankedick, Frank		8C11
Mankedick, Frank	10?	8C12
Mankedick, Frank		8C13
Mankedick, Frank	8?	8C14
Kelso, B. M.	4	8C15
Sturgeon, Samuel		8C16
Sturgeon, Samuel		8C17
Mankedick, Frank		8C18
Mankedick, Frank	5	8C19
Robb Heirs	1	8C20
Mankedick, Frank		8C21
Mankedick, Frank	7	8C22
Mankedick, Frank	6	8C23
Kelso, B. M.	3	8C24
Mankedick, Frank		8C25
Robb Heirs	6	8C26
Mankedick, Frank		8C27
Robb Heirs		8C28
Robb Heirs		8C29
McEwen, J. H. ?		8C30
Pittsburgh Coal Co.		8C31
Robb Heirs		8C32
Robb Heirs	8	8C33
Campbell, M. W.		8C34
Robb Heirs	1?	8C35
Pittsburgh Coal Co.		8C36
Pittsburgh Coal Co.		8C37
Wilson, R. ?		8C38
Robb Heirs	3	8C39
Robinson Run Cemetery		8C40
Campbell, M. W.	2	8C41
Robb Heirs	7	8C42
McEwen, James	1	8C43
Robb Heirs	5	8C44
McEwen, James	3	8C45
Wallace Heirs	6	8C46
McEwen, James	7	8C47
McEwen, James	11	8C48
Campbell, M. W.	7	8C49
Campbell, M. W.	3	8C50
Wallace Heirs	8	8C51
McEwen, James	8	8C52
Campbell, M. W.	4	8C53
Wallace Heirs	10	8C54
Kirk, James (Moran)	3	8C55
McEwen, James		8C56
Campbell, M. W.		8C57
Wallace Heirs	14	8C58
McEwen, James	10	8C59
Shane, Andrew	1	8C60

Kelso, B. M.	6	8D1
Sterling, Hugh	9	8D2
Kelso, B. M.		8D3
Sterling, Hugh		8D4
Sterling, Hugh		8D5
Sterling, Hugh	5	8D6
Campbell, M. W.	5?	8D7
Campbell, M. W.	1?	8D8
Wallace, Robert	2	8D9
Wallace, Robert	1	8D10
Kirk, James (Moran)	1	8D11
Wallace, Robert	4	8D12
Wallace, Robert	3	8D13
Kirk, James (Moran)	2	8D14
Kirk, James	3	8D15
Shane, Kate	1	8D16
Kirk, James	1	8D17
Kirk, James (Moran)	4	8D18
Kirk, James	2	8D19
Slater, J. G.		8D20
Slater, J. G.	1	8D21
Morrow, Thomas & J. E.	1	8E1
Watters, Henry		8E2
Morrow, J. E.		8E3
Hopper, E. V.	1	8E4
Sterling, Hugh	6	8E5
Hopper, E. V.	6	8E6
Hopper, E. V. (John & Daniel)		8E7
Hopper, E. V. (John & Daniel)		8E8
Hopper, E. V. (John & Daniel)		8E9
Hopper, E. V. (John & Daniel)		8E10
Hopper Heirs, John		8E11
Hopper, E. V. (John & Daniel)		8E12
Hopper Heirs, John		8E13
Sterling, Hugh		8E14
Hopper Heirs, John		8E15
Hopper, E. V. (John & Daniel)		8E16
Hopper, E. V. (John & Daniel)		8E17
Hopper Heirs, John		8E18
Slater, J. G.		8E19
Hopper Heirs, John	6	8E20
Hopper, E. V. (John & Daniel)		8E21
Hopper Heirs, John	4	8E22
Hopper Heirs, John		8E23
Hopper Heirs, John		8E24
Hopper, E. V. (John & Daniel)		8E25
Hopper Heirs, John		8E26
Hopper, Arthur J.		8E27
Hopper Heirs, John		8E28
Hopper Heirs, John		8E29
Nesbit, R. N. (W.)		8F1
Cain, Adella	1?	9K1
McBurney, E. (W. A.)		9K2
Seabright, John		9K3
Pittsburgh Coal Co.		9L1
Pittsburgh Coal Co.	1	9L2
McBurney, E. (W. A.)	2	9L3
Loffert, William		9L4
George, Samuel		9L5
Plummer(Leipold)	5?	9L6
Farrar, S. A.		9L7
Taylor, Thomas		9M1
Taylor, Thomas	5	9M2
Moses, John	5	9M3
Taylor & Robbins		9M4
Taylor & Robbins	2?	9M5
Bohey, B.		9M6
Taylor & Robbins		9M7
Taylor & Robbins		9M8
Taylor & Robbins		9M9
Moses, John	2	9M10
Moses, John	3	9M11
Moses, John	4	9M12
Moses, John	1	9M13
Prevost, D.		9M14
Prevost, D.	2	9M15
Campbell, W. C.		9M16
Prevost, D.		9M17
Prevost, D.	3	9M18
Welsh, D. W.		9M19
Campbell, W. C.		9M20
Welsh, D. W. (Cemetery Lot)		9M21
Campbell, W. C.		9M22
Campbell, W. C.	1	9M23
McCarty Heirs	5	9M24
Prevost, D. ?		9M25
McCarty Heirs	3	9M26
Robbins, T. B.	1	9M27
Danche		9M28
Prevost, D.	1	9M29
Campbell, W. C.	2	9M30
Doehre ?		9M31
McCarty Heirs	2	9M32
McCarty Heirs	6	9M33
McCarty, B. R.	4	9M34
McCarty Heirs	10	9M35
Plummer (Leipold)	2?	9M36
McCarty Heirs	8?	9M37
McCarty Heirs	9	9M38
Leipold(Plummer)		9M39
McCarty Heirs	1?	9M40
Plummer (Leipold)	1	9M41
McDonald, K. Noble	58	9N1
McDonald, K. Noble	57	9N2
Gordon, Joseph	2	9N3
McBurney, John R.	4	9N4
McDonald, K. Noble	52	9N5
McDonald, K. Noble	36	9N6
Taylor, Thomas G.	6	9N7
McBurney, John R.	9	9N8
McDonald, K. N.	35	9N9
Taylor, Thomas G.	4	9N10
Taylor, Thomas G.	7	9N11
McBurney, John R.	1	9N12
McBurney, John R.	6	9N13
McDonald, K. N.	37	9N14
McDonald, K. N.	45	9N15
Taylor, Thomas G.	2	9N16
McBurney, John R.	11	9N17
Taylor, Thomas G.	1	9N18
Bohey, B.		9N19
McBurney, John R.	3	9N20
McBurney, John R.	2	9N21
McDonald, K. Noble	32	9N22
Hicks, Charles	2 or 1	9N23
McBurney, John R.	10	9N24
Robbins, T. B.		9N25
Bohey, B.		9N26
Cagan, Mrs.		9N27
Etoni, Z. ?		9N28
McDonald, K. Noble	5	9N29
Bohey, B.		9N30
Hicks, Charles	1 or 2	9N31
Robbins, T. B.		9N32
McDonald, K. Noble	29	9N33
McDonald, K. Noble	49	9N34
Kress, F. J.	1	9N35
Bohey, B.		9N36
Strain ?		9N37
Romain		9N38
Vanderbosh		9N39
Kress, F. J.	2	9N40
Deblander	4	9N41
McDonald, K. Noble	18	9N42
McDonald, K. Noble	30	9N43
Butterworth		9N44
Deblander	1	9N45

Deblander	2	9N46
Deblander	3	9N47
Jordan		9N48
McDonald, K. Noble	7	9N49
Danche		9N50
Butterworth		9N51
Jordan		9N52
McDonald, K. Noble		9N53
George, C. J.	5 or 6	9N54
McDonald, K. Noble	13	9N55
George, C. J.	1 or 2	9N56
George, C. J.	2 or 1	9N57
George, C. J.	3 or 4	9N58
George, C. J.		9N59
George, C. J.	8	9N60
McDonald, K. Noble		9N61
McCarty, B. R.	3	9N62
George, C. J.	3 or 4	9N63
George, C. J.	9	9N64
George, C. J.	6 or 5	9N65
George, J. J.	5	9N66
George, C. J.	1 or 9	9N67
George, C. J.	7	9N68
George, C. J.		9N69
McCarty, B. R.	2	9N70
George, C. J.	5	9N71
George, J. J.	2	9N72
George, C. J.	2 or 1	9N73
George, C. J.	3	9N74
George, J. J.	1 or 2	9N75
McCarty, B. R.		9N76
George, C. J.	4	9N77
McCarty, B. R.	1	9N78
Kelso, J. R.		9N79
Crawford, Rev. J. Cockins	1	9N80
George, C. J. (4A)	2	9N81
George, C. J. (4A)	1	9N82
Kelso, J. R.	5	9N83

McDonald, Edward	29	9O1
McDonald, K. Noble	2	9O2
McDonald, K. Noble	41	9O3
McDonald, K. Noble	1	9O4
McDonald, K. Noble		9O5
McDonald, K. Noble	25	9O6
McDonald, K. Noble	42	9O7
McDonald, K. Noble	12	9O8
McDonald, Edward	13	9O9
McDonald, K. Noble	34	9O10
McDonald, K. Noble	6	9O11
McDonald, K. Noble	51	9O12
McDonald, K. Noble	28	9O13
McDonald, Edward		9O14
McDonald, K. Noble	40	9O15
McDonald, Edward		9O16
McDonald, K. Noble	33	9O17
McDonald, K. Noble	27	9O18
McDonald, K. Noble	11	9O19
McDonald, Edward	18	9O20
McDonald, K. Noble	50	9O21
McDonald, K. Noble	53	9O22
McDonald, K. Noble	38	9O23
McDonald, K. Noble	39	9O24
McDonald, K. Noble	23	9O25
Robbins, T. B.	4	9O26
McDonald, K. Noble	20	9O27
McDonald, K. Noble	15	9O28
McDonald, K. Noble	64	9O29
McDonald, K. Noble	22	9O30
McDonald, K. Noble	21	9O31
McDonald, K. Noble	24	9O32
McDonald, K. Noble	26	9O33
Rogers-Hartman		9O34
Rogers-Hartman		9O35
McDonald, K. Noble	70	9O36
McDonald, K. Noble	9	9O37
McDonald, K. Noble	31	9O38
McDonald, K. Noble	48	9O39
McDonald, K. Noble	45	9O40
McDonald, K. Noble	44	9O41
McDonald, K. Noble		9O42
McDonald, K. Noble	55	9O43

Rogers-Hartman		9O44
McDonald, K. Noble	19	9O45
McDonald, K. Noble	17	9O46
Gladden, J. R.	9	9O47
McDonald, K. Noble	47	9O48
McDonald, K. Noble	56	9O49
McDonald, K. Noble	4	9O50
Rogers-Hartman		9O51
Rogers-Hartman		9O52
McDonald, K. Noble	46	9O53
McDonald, K. Noble	54	9O54
McDonald, K. Noble		9O55
McDonald, K. Noble	43	9O56
George, J. J.	3	9O57
George, J. J.	4	9O58
Stilley, J. M.	6	9O59
Stilley, J. M.	5	9O60
Stilley J. M.	7	9O61
Stilley, J. M.	8	9O62
Stilley, J. M.	10	9O63
Stilley, J. M.	12	9O64
Gladden, J. R.	4	9O65
Stilley, J. M.	9	9O66
Stilley, J. M.		9O67
Stilley, J. M.		9O68
Stilley, J. M.	17	9O69
Gladden, J. R.	8	9O70
Stilley, J. M.	4	9O71
Stilley, J. M.	16	9O72
Stilley, J. M.	11	9O73

Brady	1	9A1
Rend, W. P.		9A2
Pittsburgh Coal Co.		9A3
Sauters-Patterson ?		9A4
McDonald Heirs	4	9A5
Wade-Ewer et al.		9A6
Wade-Ewer et al.		9A7
McDonald, Edward		9A8
McDonald, Edward	5	9A9
McDonald Heirs	3 or 4	9A10
Wade-Ewer et al.		9A11
McDonald, Edward	12	9A12
McDonald, Edward	1	9A13
McDonald Heirs	11	9A14
Cuniff, P.	1	9A15
McDonald Heirs	1	9A16
McDonald Heirs	15	9A17
Wade-Ewer et al.		9A18
Robbins, T. B. lot	1	9A19
McDonald Heirs	7	9A20
Wade-Ewer et al.		9A21
Wade-Ewer et al.		9A22
McDonald Heirs	14	9A23
McDonald Heirs	9	9A24
McDonald Heirs	6	9A25
Wade-Ewer et al.		9A26
Robbins, T. B.	3	9A27
Robbins, T. B.	2	9A28
McDonald Heirs	10	9A29
McDonald Heirs	12	9A30
Robbins, T. B.	2?	9A31
McDonald Heirs	3?	9A32
McDonald Heirs	13	9A33
McDonald Heirs	8	9A34
McDonald Heirs	5	9A35
Wade-Ewer et al.		9A36
Wade-Ewer et al.		9A37
Gladden, J. R.	12	9A38
Gladden, J. R.	1	9A39
Gladden, J. R.	20	9A40
Wade-Ewer et al.		9A41
Gladden, J. R.	16	9A42
Wade-Ewer et al.	3	9A43
Gladden, J. R.	10	9A44
Crowley, William	1	9A45
Moorhead, W. B.	1	9A46
Crowley, William (Amon Co.)	1	9A47
Gladden, J. R.	19	9A48
Crowley, William		9A49
Crowley, William	2	9A50
Gladden, J. R.	11	9A51

Moorhead, W. B.	2 or 10	9A52
Crowley, William		9A53
Gladden, J. R.	18	9A54
Moorhead, W. B.	3	9A55
Moorhead, W. B.	9	9A56
Gladden, J. R.	15(7)	9A57
Gladden, J. R.	17	9A58
Wallace & Miller	3	9B1
Wallace Heirs	1	9B2
Wallace & Miller	1	9B3
Wallace & Miller	2	9B4
Wade-Ewer et al.		9B5
Wallace Heirs	3	9B6
Wallace & Miller	8	9B7
Wallace & Miller	4	9B8
Wallace & Miller	6	9B9
Woods, W. F.	2	9B10
Wallace Heirs	16	9B11
Wallace & Miller	5	9B12
Wallace & Miller	7	9B13
Woods, W. F.	8	9B14
Wallace Heirs	9	9B15
Woods, W. F.	1	9B16
Woods, W. F.	6	9B17
Woods, W. F.	7	9B18
Dickson, W. A.	5	9B19
Wade-Ewer et al.	1	9B20
Woods, W. F.	9	9B21
Woods, W. F.	5	9B22
Woods, W. F.	3	9B23
Miller, G. H.	5	9B24
Dickson, W. A.	6	9B25
Wade-Ewer et al.	4?	9B26
Woods, W. F.	4	9B27
Miller, G. H.	3	9B28
Wade-Ewer et al.	2	9B29
Miller, G. H.	1	9B30
Hallam, Thomas	2	9B31
Wade-Ewer et al.	1	9B32
Miller, G. H.	6	9B33
Miller, G. H.		9B34
Wade-Ewer et al.	3	9B35
Miller, G. H.	2	9B36
McEwen (Steele & Co.)	1	9B37
Cook, N. G.	2	9B38
Brown, R. C.	2?	9B39
Wade-Ewer et al.	6?	9B40
Wade-Ewer et al.		9B41
Wade-Ewer et al.	5	9B42
Miller, G. H.	4	9B43
Brown, R. C.	1? or 2?	9B44
Gladden, Richard	5	9B45
Gladden, Richard	12	9B46
Gladden, Richard	13	9B47
Cook, N. G.	3	9B48
Gladden, Richard	10	9B49
Cook, N. G.	1	9B50
Cook, N. G.	5	9B51
Gladden, Richard	11	9B52
Gladden, Richard	16	9B53
Cook, N. G.	7(1)	9B54
Cook, N. G. (Steele & Co.)	2	9B55
Gladden, Richard	2	9B56
Moorhead, W. B.	8	9B57
Gladden, Richard	9	9B58
Wallace Heirs	12 or 11?	9C1
Kirk, James (Moran)	5	9C2
Shane, Andrew	9	9C3
Wallace Heirs	11 or 12?	9C4
Dickson, W. A.	7	9C5
McEwen, James	11?	9C6
Shane, Andrew	3 or 2 or 5?	9C7
Shane, Andrew	5 or 3?	9C8
Shane, Andrew	8 or 4?	9C9
Wallace Heirs	13	9C10
Dickson, W. A.	8	9C11
Dickson, W. A.	2?	9C12
Shane, Andrew	2 or 5?	9C13
Shane, Andrew	6 or 2?	9C14
Wallace Heirs	7	9C15
Dickson, W. A.	9	9C16
Dickson, W. A.	11	9C17
Shane, Andrew	7	9C18
Dickson, W. A.	1	9C19
Shane, Andrew	4	9C20
Cook, N. G.	5	9C21
Dickson, W. A.	4	9C22
Potter, R. D.	1 or 2?	9C23
Dickson, W. A.		9C24
Cook, N. G.	6	9C25
Dickson, W. A.	3	9C26
Dickson, W. A.	12	9C27
Potter, R. D.	3 or 5?	9C28
Dickson, W. A.	10	9C29
Potter, R. D.	2	9C30
Hallam, Thomas	1	9C31
Potter, R. D.	5	9C32
Potter, R. D.		9C33
Potter, R. D.	8	9C34
Potter, R. D.	7?	9C35
Potter, R. D.	7?	9C36
Cook, N. G.	4	9C37
Cook, N. G.	6	9C38
Dickson, D. F.	3 or 1?	9C39
Dickson, D. F.	3?	9C40
Rend, W. P.	7	9C41
Shane Bros.		9C42
Rend, W. P.		9C43
Cook, N. G.	12(6)	9C44
Cook, N. G.	13(7)	9C45
Cook, N. G.	11(5)	9C46
Dickson, D. F.	2	9C47
Rend, W. P.	3	9C48
Shane Bros. (Ciaffoni, Paul)	5	9C49
Rend, W. P.	2	9C50
Rend, W. P.	1	9C51
Kirk, James	4	9D1
Shane, Kate	3	9D2
Shane, John P.		9D3
Shane, John P.		9D4
Shane, John P.		9D5
Shane, Kate	2	9D6
Campbell, James		9D7
Cook, N. G.		9D8
Shane, Kate ?		9D9
Shane, John P.		9D10
Campbell, James		9D11
Cook, N. G.	7	9D12
Campbell, James	1	9D13
Campbell, Joseph	1	9D14
Patterson, John	4	9D15
Cook, N. G.		9D16
Cook, N. G.	5	9D17
Cook, N. G.		9D18
Patterson, John	3	9D19
Patterson, John	5	9D20
Walker, J. D.		9D21
Cook, N. G.		9D22
Cook, N. G.	3	9D23
Patterson, John	2	9D24
Hastings, O. H. & J. M.		9D25
Walker, J. D.	1	9D26
Patterson, John	1	9D27
Hastings, O. H. & J. M.		9D28
Anderson	3	9D29
Hastings, O. H. & J. M.	2	9D30
Hastings, O. H. & J. M.		9D31
Anderson	1	9D32
Hastings, O. H. & J. M.	3	9D33
Rend, W. P.	5	9D34
Slater, J. G.		9E1
Hopper Heirs, John	5	9E2
Hopper Heirs, John	2?	9E3
Slater, J. G.	2	9E4
Hopper Heirs, John	8	9E5
Hopper Heirs, John	3	9E6
Hopper Heirs, John		9E7
Hopper, Arthur	5	9E8
Hopper Heirs, John	1	9E9
Campbell, James	2	9E10
Campbell, James		9E11

Campbell, James		9E12
Campbell, James	4	9E13
Campbell, S. J.		9E14
Campbell, James		9E15
Jackson, John		9E16
Jackson, John	2	9E17
Campbell, S. J.		9E18
Jackson, John	5?	9E19
Jackson, John	5	9E20
Campbell, James		9E21
Campbell, James	3	9E22
Jackson, Samuel	4	9E23
Campbell, James		9E24
Campbell, James		9E25
Campbell, James		9E26
Simington	1?	10K1
Raab, H. G. (Robb Bros.)	1?	10L1
Carl, O.		10L2
Carl, O.		10L3
Farrar, S. A.		10L4
Farrar, S. A.	1	10L5
Farrar, S. A.		10L6
McBurney, E.		10L7
Carl, O.		10L8
McBurney, E.		10L9
Raab, H. G.		10L10
George, R. S.		10M1
George, R. S.		10M2
McCarty Heirs	4?	10M3
McCarty Heirs	7 or 1	10M4
George, R. S.		10M5
Farrar, R. S.		10M6
Farrar, R. S.		10M7
Farrar, R. S.		10M8
George, R. S.		10M9
Farrar, R. S.		10M10
George, R. S.		10M11
George, R. S.		10M12
Glass, W. M.		10M13
Glass, W. M.		10M14
McBride Heirs, W. H.		10M15
Espe	3	10N1
Espe	1	10N2
Espe	2	10N3
Cowden, A. T.	3	10N4
Berry, J. G.	3	10N5
McBride Heirs, W. H.		10N6
Cowden, A. T.	2	10N7
Berry, J. G.	4	10N8
Cowden, A. T.	1	10N9
Berry, J. G.	1	10N10
Berry Heirs	6	10N11
Berry Heirs	8	10N12
Berry Heirs	12	10N13
Berry Heirs		10N14
George, J. J.	1A?	10O1
Kelso, J. R.	1	10O2
Kelso, J. R.		10O3
Stilley, J. M.	13	10O4
Gladden, J. R.	3 or 13	10O5
Gladden, J. R.		10O6
Gladden, J. R.	2 or 12	10O7
Stilley, J. M.	14	10O8
Kelso, J. R.		10O9
Stilley, J. M. (33A)	1	10O10
Crawford, Matthew	4	10O11
Stilley, J. M. (33A)	3	10O12
Stilley, J. M.	15	10O13
Crawford, Matthew	1?	10O14
Kelso, J. R.		10O15
Crawford (33A)	7	10O16
Crawford, Matthew		10O17
Robbins, T. B. & Son	3	10O18
Robbins, T. B. & Son	1	10O19
Crawford, Matthew	2	10O20
Crawford, Matthew		10O21
Kelso, J. R.		10O22
Scott Heirs, John	5	10O23
Kelso, W. J.	1	10O24
Berry, J. G.	2	10O25
Scott Heirs, John		10O26
Berry, J. G.	2	10O27
Scott Heirs, John	3	10O28
Kelso, W. J.	3	10O29
Scott Heirs, John	1	10O30
Scott Heirs, John	2	10O31
Scott Heirs, John		10O32
Berry, J. G.	5	10O33
Scott, James	1	10O34
Scott, James	3	10O35
Scott, James	2	10O36
Kelso, W. J.	2	10O37
Scott, James	10	10O38
Scott, James	4	10O39
Scott, James	12 or 5	10O40
Scott, James	13	10O41
Scott, James	5 or 12	10O42
Scott, James	6	10O43
Moorhead, W. B.	6	10A1
Gladden, J. R.	5	10A2
Gladden, J. R.	14 or 13	10A3
Gladden, J. R.	22	10A4
Moorhead, W. B.	5	10A5
Gladden, J. R.	23	10A6
Moorhead, W. B.	4	10A7
Moorhead, M.	4	10A8
Stilley, J. M.	2	10A9
Gladden, J. R.	6	10A10
Robbins, T. B. & Son	7 or 6	10A11
Robbins, T. B. & Son	6 or 7	10A12
Moorhead, M.	2	10A13
Sauters, J. D. (Rend)	2	10A14
Sauters, J. D. (Rend)	10	10A15
Robbins, T. B. & Son	8	10A16
Robbins, T. B. & Son	2	10A17
Crawford	6	10A18
Robbins, T. B. & Son	9	10A19
Moorhead, M.	5	10A20
Robbins, T. B. & Son	5	10A21
Robbins, T. B. & Son	4	10A22
Sauters, J. D. (Rend)	1	10A23
Little, James A.	2	10A24
Kelso, W. J.	4	10A25
Sauters, J. D. (Rend)	5	10A26
Little, James A.	9	10A27
Sauters, J. D. (Rend)	4	10A28
Kelso, W. J.	5	10A29
Sauters, J. D. (Rend)	8	10A30
Sauters, J. D. (Rend)	7	10A31
Kelso, W. J.	6	10A32
Little, James A.	14	10A33
Little, James A.		10A34
Sauters, J. D. (Rend)	9	10A35
Little, James A.	7	10A36
Little, James A.	3	10A37
Little, James A.	5	10A38
Scott, J. P.	1	10A39
Little, James A.	17	10A40
Little, James A.	10	10A41
Little, James A.	6	10A42
Little, James A.	20	10A43
Little, James A.	15	10A44
Little, James A.	12	10A45
Little, James A.	21	10A46
Scott, J. P.	16	10A47
Little, James A.	13	10A48
Moorhead, M.	1	10B1
Gladden, Richard	14	10B2
Gladden, Richard	3	10B3
Cook, N. G.	9(3)	10B4
Moorhead, M.	3	10B5

Moorhead, M.	7	10B6
Gladden, Richard	4	10B7
Moorhead, M.	6	10B8
Cubbage Heirs		10B9
Cubbage Heirs		10B10
Gladden, Richard	8	10B11
Gladden, Richard	1	10B12
Springer, L. E.	1	10B13
Gladden, Richard	7	10B14
Gladden, Richard	5	10B15
Springer, L. E.	5	10B16
Gladden, Richard	6	10B17
Cubbage Heirs		10B18
Springer, L.E.	4	10B19
Sauters, J. D. (Rend)	3	10B20
Scott, J. P.	9	10B21
Springer, L. E.	2	10B22
Cubbage Heirs		10B23
Springer, L. E.	3	10B24
Sauters, J. D. (Rend)	6	10B25
Scott, J. P.	6	10B26
Scott, J. P.	4	10B27
Scott, J. P.	10	10B28
Cubbage Heirs		10B29
Scott, J. P.	12	10B30
Cubbage Heirs		10B31
Kelly, John W.		10B32
Kelly, John W.		10B33
Scott, J. P.	20	10B34
Scott, J. P.	13	10B35
Scott, J. P.	2	10B36
Kelly, John W.		10B37
Scott, J. P.	21	10B38
Scott, J. P.	3	10B39
Kelly, John W.		10B40
Kelly, John W.		10B41
Kelly, John W.		10B42
Scott, J. P.	23	10B43
Shane Bros. (Ciaffoni, Paul)	2	10C1
Shane Bros. (Ciaffoni, Paul)		10C2
Rend, W. P.	4	10C3
Cook, N. G. (Steele & Co.)	1	10C4
Shane Bros. (Ciaffoni, Paul)		10C5
Rend, W. P.	6	10C6
Shane Bros. (Ciaffoni, Paul)	4	10C7
Cook, N. G.	8(2)	10C8
Cook, N. G.	10(4)	10C9
Shane Bros. (Ciaffoni, Paul)	1	10C10
Shane Bros. (Ciaffoni, Paul)	8	10C11
Shane Bros. (Ciaffoni, Paul)	3	10C12
Cubbage Heirs	7	10C13
Miller, W. J.	10	10C14
Shane Bros. (Ciaffoni, Paul)		10C15
Shane Bros. (Ciaffoni, Paul)	10	10C16
Miller, W. J.	5	10C17
Miller, W. J.	7	10C18
Cubbage Heirs		10C19
Shane Bros.	9	10C20
Shane Bros.	12	10C21
Miller, W. J.	8	10C22
Miller, W. J.	1	10C23
Miller, W. J.		10C24
Shane Bros.	11	10C25
Miller, W. J.	9	10C26
Miller, W. J.	6	10C27
Cubbage Heirs	9	10C28
Miller, W. J.	11	10C29
Shane Bros.	15	10C30
Cubbage Heirs	6	10C31
Miller, W. J.	3	10C32
Miller, W. J.	14	10C33
Miller, W. J.	15	10C34
Miller, W. J.	13	10C35
Shane Bros.	13	10C36
Cubbage Heirs		10C37
Miller, W. J.	12	10C38
Shane Bros.	14	10C39
McPeak, D.	1	10C40
Miller, W. J.	16	10C41
Miller, W. J.	4	10C42
Kelso, George & W. W.	7	10C43
Kelso, George & W. W.	5	10C44
Kelso, George & W. W.		10C45
Kelso, George & W. W.	3	10C46
Kelso, George & W. W.	1	10C47
Kelso, George & W. W.	6	10C48
Kelso, George & W. W.		10C49
McPeak, W.		10C50
Clark, J. E.	1	10D1
Hastings, O. H. & J. M.	4	10D2
Clark, J. E.	2	10D3
McPeak, D.	1	10D4
McConnoughy, M.		11M1
Cockins, J. L.	2	11N1
Cockins, John L.	1	11N2
Berry Heirs	9	11N3
Cockins, J. L.	1	11N4
Berry Heirs	7	11N5
Reed, George M.	4	11N6
Berry Heirs	10	11N7
Reed, George J.	3	11N8
Berry Heirs	11	11N9
Reed, George M.	1	11N10
Brown, James		11N11
Reed, George M.		11N12
Reed, George M.		11N13
Reed, George M.	2	11N14
Scott, James	14	11O1
Little, James A.	22	11O2
Berry Heirs	1	11O3
Scott, James	8	11O4
Scott, James	7	11O5
Scott, James	9	11O6
Scott, James	11	11O7
Berry Heirs	2	11O8
George Heirs	2	11O9
George Heirs	3	11O10
George Heirs	4	11O11
George Heirs	5	11O12
Scott, Annie M.	6	11O13
George Heirs	1	11O14
Berry Heirs	3	11O15
Berry Heirs		11O16
George Heirs		11O17
Scott, John, Jr.	1	11O18
Berry Heirs		11O19
Berry Heirs		11O20
Cowden, Mark		11O21
Cowden, Mark		11O22
Cowden, Mark		11O23
Little, James A.	1	11A1
Little, James A.	16	11A2
Little, James A.	19	11A3
Little, James A.	23	11A4
Little, James A.	18	11A5
Scott, Annie M.	1	11A6
Scott, Annie M.	3	11A7
Scott, J. P.	18	11A8
Scott, J. P.	17	11A9
Little, James A.	11	11A10
Scott, J. P.	22	11A11
Scott, Annie M.	5	11A12
Scott, Annie M.	4	11A13
Scott, Annie M.	2	11A14
Hissom, S. K.	8	11A15
Hissom, S. K.	4	11A16
Barnes, Ella	1	11A17
Clark, James	1	11A18
Clark, James	3	11A19
Clark, James	2	11A20
Scott, J. L.	1	11A21
Hissom, S. K.	10	11A22

Barnes, Ella		11A23
Scott, J. P.		11A24
Burgan-Sterling (Wheeling)	19	11A25
Monrean, John		11A26
Burgan-Sterling (Gruver)	34	11A27
Burgan-Sterling (Gruver)	46	11A28
Scott, John, Jr.	2	11A29
Scott, J. L.	5	11A30
Burgan-Sterling (Wheeling)	18	11A31
Burgan-Sterling (Fisher)	11	11A32
Burgan-Sterling (Fisher)	2	11A33
Scott, J. L.		11A34
Burgan-Sterling (Gruver)	35	11A35
Monrean, John		11A36
Scott, J. P.	8	11A37
Scott, J. L.		11A38
Burgan-Sterling (Wheeling)	21	11A39
Burgan-Sterling (Wheeling)	20	11A40
Burgan-Sterling (Fisher)	10	11A41
Burgan-Sterling (Gruver)		11A42
Burgan-Sterling (Gruver)	33	11A43
Burgan-Sterling		11A44
Burgan-Sterling	4	11A45
Burgan-Sterling (Fisher)	8	11A46
Burgan-Sterling (Fisher)	1	11A47
Scott, J. L.		11A48
Burgan-Sterling (Wheeling)	45	11A49
Burgan-Sterling (Fisher)	7	11A50
Burgan-Sterling (Wheeling)	22	11A51
Burgan-Sterling (Fisher)	31	11A52
Burgan-Sterling (Fisher)	32	11A53
Burgan-Sterling (Fisher)	41	11A54
Burgan-Sterling (Fisher)	9	11A55
Burgan-Sterling (Gallagher)	23	11A56
Burgan-Sterling (Florence)	15	11A57
Burgan-Sterling (Gallagher)	2	11A58
Burgan-Sterling (Gallagher)	39	11A59
Burgan-Sterling (Fisher)	30	11A60
Burgan-Sterling (Fisher)	28	11A61
Burgan-Sterling (Gallagher)	38	11A62
Burgan-Sterling (Gallagher)	25	11A63
Burgan-Sterling (Florence)	16	11A64
Burgan-Sterling (Fisher)	36	11A65
Burgan-Sterling (Gallagher)	1	11A66
Burgan-Sterling (Borcher ?)	13 or 1	11A67
Burgan-Sterling (Gallagher)	27	11A68
Burgan-Sterling (Orchard)		11A69
Burgan-Sterling (Stable yard)	17	11A70
Burgan-Sterling (Fisher)	29	11A71
Burgan-Sterling (Gallagher)	24	11A72
Burgan-Sterling (Cornpatch)	1?	11A73
Harper Heirs	8	11A74
Burgan-Sterling (Fisher)	12	11A75
Burgan-Sterling (Philadelphia)	4	11A76
Burgan-Sterling (Philadelphia)	40	11A77
Burgan-Sterling (Philadelphia)	37	11A78
Burgan-Sterling (Florence)	42	11A79
Burgan-Sterling (Cornpatch)		11A80
Burgan-Sterling (Cornpatch)		11A81
Burgan-Sterling (Cornpatch)		11A82
Harper Heirs	6	11A83
Burgan-Sterling (Fisher)		11A84
Burgan-Sterling (Fisher)	44	11A85
Burgan-Sterling (Philadelphia)	5	11A86
Burgan-Sterling (Philadelphia)	6	11A87
Burgan-Sterling (Philadelphia)	2	11A88
Harper Heirs	5	11A89
Burgan-Sterling (Philadelphia)	3	11A90
Burgan-Sterling (Philadelphia)	1	11A91
Harper Heirs	11 or 12	11A92
Harper Heirs	3	11A93
Harper (Burgan-Sterling)		11A94
School Lot ?		11A95
Johnson (Burgan-Sterling)		11A96
May, J. B. (Jane Ann)	2	11A97
Johnson (Burgan-Sterling)		11A98
Harper Heirs	1	11A99
Harper Heirs	10	11A100
May, J. B.	1	11A101
Harper Heirs	9	11A102
Harper Heirs	12?	11A103
Harper Heirs	4	11A104
Harper Heirs		11A105
Moore, J. G.	5	11A106
Moore, J. G.	1	11A107
Moore, J. G.	4	11A108
Scott, J. P.	5	11B1
Kelly, John W.		11B2
Scott, J. P.	11	11B3
Scott, J. P.	15	11B4
Scott, J. P.	14	11B5
Kelly, John W.		11B6
Kelly, John W.		11B7
Kelly, John W.		11B8
Scott, J. P.	19	11B9
Connor, Samuel	5	11B10
Connor, Samuel	4	11B11
Connor, Samuel	7	11B12
Patterson, William	1	11B13
Giffin, J. W.	9	11B14
Patterson, William	4	11B15
Patterson, William	2	11B16
Giffin, J. W.	11	11B17
Connor, Samuel	6	11B18
Cubhage, S. J.	6	11B19
Burgan-Sterling (Philadelphia)		11B20
Patterson, William	3	11B21

Burgan-Sterling (Philadelphia)	1 or 2	11B22
Giffin, J. W.	10	11B23
Burgan-Sterling (Philadelphia)		11B24
Giffin, J. W.	1	11B25
Patterson, William	5	11B26
Giffin, J. W.	3	11B27
Cubbage, S. J.	1	11B28
Cubbage, S. J.	5	11B29
Burgan-Sterling (Philadelphia)	2 or 5	11B30
Giffin, J. W.	12	11B31
Giffin. J. W.	8	11B32
Walker, T. W.		11B33
Giffin, J. W.	5	11B34
Walker, T. W.		11B35
Walker, T. W.		11B36
Walker, T. W.		11B37
Walker, T. W.		11B38
Burgan-Sterling (Philadelphia)	3	11B39
Burgan-Sterling (Philadelphia)		11B40
Giffin, J. W.	7	11B41
Cubbage, S. J.	2?	11B42
Burgan-Sterling (Byerly)		11B43
Giffin, J. W.	2	11B44
Burgan-Sterling (Byerly)		11B45
Donaldson, J. A. ?		11B46
Campbell (J. R. Miller)		11B47
Giffin, J. W.	6	11B48
Mankedick, F.	3	11B49
School Lot ?		11B50
Donaldson, J. A.	2?	11B51
Giffin, J. W.	4	11B52
Anderson, Rev. A. R.	1	11B53
Donaldson, J. A.	2 or 1	11B54
Anderson, A. R.		11B55
Moore Heirs		11B56
Venice U. P. Church	1	11B57
Mankedick, F.	7	11B58
Moore Heirs	4	11B59
Moore Heirs	1	11B60
Mankedick, F.	2	11B61
Mankedick, F.	1	11B62
Donaldson, J. A.	3	11B63
Carlisle, Robert	2	11B64
Moore, J. G.	3	11B65
Moore Heirs	5	11B66
Mankedick, F.		11B67
Kelly, John W.		11C1
Kelso, George & W. W.	2	11C2
Kelso, George & W. W.		11C3
Connor, Samuel	2	11C4
Connor, Samuel	1	11C5
Kelso, W. H.	1?	11C6
Kelso, W. H.	2?	11C7
Borland, A. J.		11C8
Connor, Samuel	3	11C9
Kelso, W. H.	3?	11C10
Cubbage. S. J.	4	11C11
Kelso, W. H.		11C12
Cubbage, S. J.	3	11C13
Mankedick, F.	4	11C14
Cowden, J. S.	2	11C15
Cowden, J. S.	3	11C16
Cowden, J. S.	1	11C17
Morgan, Luther		12N1
Brown, M. B.		12N2
Engle, Henry		12O1
Moore, A. J.	7	12O2
Harper Heirs	2	12A1
Harper Heirs	7	12A2
Moore, J. G.	6	12A3
Sterling, Hugh (Burgan, A. M. J.)		12A4
Sterling, Hugh (Burgan, A. M. J.)		12A5
Moore, J. G.	8	12A6
Moore, J. G.	16	12A7
Sterling, Hugh (Burgan, A. M. J.)		12A8
Moore, J. G.	10	12A9
Moore, J. G.	15	12A10
Moore, J. G.	2	12A11
Sterling, Hugh (Burgan, A. M. J.)		12A12
Moore, J. G.	11	12A13
Moore, J. G.	14	12A14
Moore, J. G.	17	12A15
Sterling, Hugh (A. R. Hamilton)	1	12A16
Moore, A. J.	3	12A17
Moore, J. G.	9	12A18
Moore, A. J.	2	12A19
Moore, J. G.		12A20
Patterson, James	2	12A21
Cemetery Lot	1	12A22
Patterson, James	3	12A23
Scott, Dr.	1	12A24
Patterson, James		12A25
Moore, A. J.	6	12A26
Barnett, S. J.		12A27
Moore, A. J.	4	12A28
Barnett, S. J.		12A29
Barnett, S. J.		12A30
Barnett, S. J.		12A31
Carlisle, Robert		12B1
Moore Heirs	6	12B2
Carlisle, Robert	1?	12B3
Moore, J. G.	18	12B4
Giffin, J. F.	1	12B5
Moore Heirs	3	12B6
Moore Heirs	2	12B7
Giffin, J. F.	2	12B8
Mankedick, F.	5	12B9
Upcraft, T. M.	1	12B10
Moore, J. G.	7	12B11
Upcraft, T. M.	2	12B12
Caldwell, G. M.	2	12B13
Upcraft, T. M.	5	12B14
Upcraft, T. M.	6	12B15
Moore, J. G.	13	12B16
Upcraft, T. M.	3	12B17
Caldwell, G. M.	3	12B18
Caldwell, G. M.	4	12B19
Caldwell, G. M.	1	12B20
Glass, George N.	1	12B21
Moore, J. G.		12B22
Upcraft, T. M.	4	12B23
Glass, George N.	2	12B24
Ciaffoni, Paul	1?	12B25
Glass, George N.		12B26
Glass, George N.	3	12B27
Glass, George N.	1	12B28
Glass, George N.	6	12B29
Scott, Dr.	2	12B30
Glass, George N.	4	12B31
Glass, George N.	5	12B32
Bell, Rev.		12B33
Bell, Rev.		12B34
White, J.		12B35
Howell, J. W. (Lindsey Heirs)		12B36
White, J.		12B37
Caldwell, W.		12B38
Howell, J. W. (Lindsey Heirs)		12B39
Wallace, Charles		12C1
Herriott, J. M.		13O1
Barnett, S. J.		13A1
Miller Bros. (Potts)		13A2
Barnett, S. J.		13A3
Caldwell, W.		13B1
White, J.		13B2
Caldwell, W.		13B3

DESCRIPTION OF SAMPLES

WOODLAND OIL COMPANY, S. B. PHILLIPS NO. 1 WELL*

Robinson Township, Allegheny County, Pennsylvania

Completed December 6, 1894

Description by A. I. Ingham

THICKNESS FEET	DESCRIPTION OF STRATA	DEPTH IN FEET	
86	No samples	0	86
4	Coal, *Pittsburgh*	86	90
	CONEMAUGH GROUP, 612 FEET (90-702)		
	Top of Pittsburgh limestone	90	
5	Limestone, dove gray, with some interbedded light gray shale	90	95
5	Sandstone, light gray to white, very fine to fine grained, slightly calcareous, highly micaceous, occasional dark mineral	95	100
9	Limestone and shale, limestone light grayish brown, shale dark gray, highly carbonaceous, few fragments sandstone same as 95-100. Some coal in lower 2 feet	100	109
1	Shale, light reddish and gray, calcareous in part	109	110
2	Siltstone, sandstone, and shale, gray and red, siltstone is calcareous, sandstone, fine grained	110	112
12	Marl, whitish, with some reddish siltstone at 115-119, interbedded shale and marl 119-124	112	124
6	Shale and siltstone, shale is light gray, siltstone is reddish and calcareous, common pyrite	124	130
9	Sandstone and limestone; sandstone, light gray, in very fine grained aggregates, common dark mineral and pyrite, highly micaceous; limestone, light gray and reddish; some sideritic(?) silty limestone	130	139
	Bottom of Pittsburgh limestone		139
5	Sandstone, light gray, very fine to fine grained, highly micaceous, common carbonaceous plant fragments, some sideritic(?) limestone	139	144
5	Siltstone, light gray, highly micaceous, some sideritic(?) limestone	144	149
5	Sandstone, shale, and siltstone, varicolored gray and white. Sandstone is fine grained, some sideritic(?) limestone	149	154
5	Sandstone, grayish red, very fine to medium grained with some large quartz fragments	154	159
5	Sandstone, and sideritic(?) siltstone, sandstone is light gray, fine grained; siltstone is pale red	159	164
3	Sandstone, light gray, loose, very fine to fine grained, poorly sorted	164	167
6	Shale and sideritic(?) siltstone; 80 per cent shale, light gray, silty; siltstone, pale red	167	173
6	Siltstone, light gray, highly micaceous, common carbonized plant fragments	173	179
5	Shale, light gray, silty	179	184
10	Sandstone and silty shale, medium gray, sand in very fine grained aggregates	184	194
5	Shale, medium gray, silty, common pyrite	194	199
10	Shale, varicolored gray and red, predominantly red	199	209
20	Sandstone and shale, 75 per cent shale; sandstone, gray, in very fine grained aggregates; shale, grayish red and silty, marly; pyrite nodules 214-219	209	229
5	Sandstone and shale, similar to above but approximately 50 per cent shale	229	234
5	Shale, argillitic(?) light gray and pale red	234	239
11	Sandstone and shale, 85 per cent shale 239-244, less shale 244-250; shale medium gray to pale red, calcareous; sandstone, light gray, in very fine grained aggregates, highly micaceous	239	250

* This well was erroneously placed in North Fayette Township in Munn's (1911, p. 25) Carnegie Quadrangle report and by Matteson and Busch (1944, Pls. 2,14). It is located approximately 9000 feet northeast of Gayly, Robinson Township, Allegheny County.

THICKNESS FEET	DESCRIPTION OF STRATA	DEPTH IN FEET	
8	Shale, light red and gray, red shale is calcareous; sandy from 255-258	250	258
7	Shale, light gray, few pieces limestone, common pyrite	258	265
5	Coal, *Duquesne*(?)	265	270
5	Shale, dark gray to black	270	275
5	Sandstone and shale, light gray and pale red; sandstone is very fine grained, highly micaceous, irregularly calcareous; carbonized plant fragments in shale	275	280
20	Shale, light gray, silty; highly micaceous 290-300; some reddish calcareous shale 280-290	280	300
5	Sandstone and shale, 50 per cent of each, shale like 280-300, sandstone in very fine grained aggregates	300	305
5	No samples	305	310
15	Shale, light gray, silty, with some carbonaceous plant fragments	310	325
5	Limestone, light gray, *Ames*	325	330
15	Sandstone, light gray, and pale red, very fine grained, calcareous	330	345
16	Shale, light gray, sandy and silty, common muscovite	345	361
21	Shale, medium gray, silty, common reddish marl 371-382	361	382
5	Sandstone and shale, sandstone, light gray, fine grained and argillaceous, shale is sandy; some coal	382	387
15	Sandstone, light gray, fine grained, silty and argillaceous with some pale red shale	387	402
17	No samples	402	419
19	Sandstone as in 387-402, sand loose 425-438	419	438
70	Shale, light gray, silty, with some red sandy and carbonized plant fragments; sandy 486-508	438	508
5	No samples	508	513
6	Sandstone, light gray to white, in very fine grained aggregates, highly micaceous	513	519
5	No samples	519	524
11	Shale, silty, dark gray to black 524-529, dark to medium gray 529-535	524	535
6	Shale with some sand and coal, shale, light gray; sandstone light gray, in grained aggregates	535	541
14	Sandstone, light gray, fine to medium grained, common muscovite	541	555
8	No samples	555	563
14	Shale, dark gray to black, silty, some coal 563-570	563	577
44	Shale, medium gray, carbonized plant fragments 577-591, sandy 591-621; some coal 591-598; silty 577-591; few fragments red shale	577	621
6	No samples	621	627
31	Shale, medium gray, sandy, few red shale fragments, some very fine grained to medium grained sandstone 633-639	627	658
12	Shale, light gray, silty, common reddish, sandy, calcareous shale	658	670
13	Shale, light gray, silty, some fragments red shale	670	683
19	Sandstone and shale, interbedded, sandstone is light gray, in very fine grained aggregates; shale is light gray, *Mahoning sandstone (Big Dunkard)*	683	702
	ALLEGHENY GROUP, RESTRICTED, 187 FEET (702-889)		
1	Coal, *Upper Freeport*	702	703
15	Shale, light gray	703	718
14	Shale, dark gray to black, few fragments medium gray, very fine grained sandstone	718	732
16	Shale, light gray, few fragments medium gray, very fine grained sandstone	732	748
16	Shale, medium gray, few fragments medium gray, fine grained sandstone	748	764
7	Coal, *Lower Freeport*	764	771
8	Siltstone, light gray, common muscovite, few fragments coal; some red shale	771	779
7	Shale, light gray, silty	779	786
16	Shale, medium to dark gray, rarely red, highly micaceous, silty	786	802
8	Shale, almost black, silty, highly micaceous	802	810
8	Shale, similar to above but dark gray	810	818
7	Shale, medium gray	818	825
6	Shale, dark gray to black, silty, common coal fragments	825	831
8	Shale, light gray	831	839

THICKNESS FEET	DESCRIPTION OF STRATA	DEPTH IN FEET	
7	Coal, with some highly carbonaceous black shale, *Middle Kittanning*	839	846
6	Marl and silty clay with some very fine sand, marl is yellowish white; clay and sand, medium gray	846	852
10	Sandstone and shale, sand is medium gray, very fine grained, well rounded, silty; shale is dark gray to black	852	862
7	No samples	862	869
3	Coal and sand, sand is medium gray, very fine to fine grained	869	872
6	Shale and sandstone, shale is dark gray to black, sandy; sandstone is medium gray and occurs in very fine grained aggregates and loose	872	878
6	Shale, dark gray and pale red, silty	878	884
5	Coal, *Lower Kittanning*	884	889
	UPPER POTTSVILLE—KANAWHA SERIES, 343 FEET (889-1232)		
1	Shale and siltstone, dark gray to black, with some coal fragments	889	890
7	Shale, light gray, silty	890	897
5	Shale and sandstone, shale is light gray and silty, sandstone is light gray and in very fine grained aggregates	897	902
12	Shale, light gray, silty	902	914
7	Shale, light gray, sandy, with interbedded sand 919-921	914	921
9	Shale, light gray, blocky from 921-924; few fragments limestone 928-930	921	930
1+	Shale, dark gray, sandy and silty	930	?
10	Shale, light gray and pale red becoming very sandy 948-952	942	952
5	Coal, *Clarion*(?)	952	957
10	Shale, dark gray 957-959, light reddish 959-967, silty, some yellowish marl 959-960	957	967
3	Coal, *Brookville*(?)	967	970
	Top of Homewood sandstone, First Salt sand	970	
6	Sandstone and shale, sandstone is medium gray and in very fine grained aggregates; shale is dark gray to black and pale red	970	976
10	Sandstone and shale, interbedded, sandstone is light gray and in very fine grained aggregates, shale is dark gray	976	986
10	Coal, shale, and sandstone, shale is sandy, dark gray to black, sandstone is shaly, very fine grained	986	996
12	Sandstone and shale, interbedded, chiefly sandstone 996-1001 and 1004-1008; sandstone is light gray, and pale red, very fine grained; shale is dark gray to black	996	1008
6	Shale, medium gray, sandy, with some medium gray, fine grained sandstone	1008	1014
9	Sandstone, clear to slightly milky, fine to medium grained, angular, with rare sandy shale	1014	1023
2	Sandstone and shale, approximately 50 per cent of each, dark gray, sandstone is fine to medium grained	1023	1025
	Bottom of Homewood sandstone		1025
15	Shale, as above, with some medium gray, fine grained sandstone	1025	1040
7	Sandstone and shale, approximately 50 per cent of each, like samples at 1023-1025; shale appears waxy at 1045-1047	1040	1047
1	No samples	1047	1048
3	Shale, medium gray, silty with some medium gray, fine grained sandstone	1048	1051
3	No samples	1051	1054
11	Sandstone and shale, approximately 50 per cent of each, sandstone is light gray to white, fine grained; shale is medium gray	1054	1065
	Top of Upper Connequenessing sandstone, Second Salt sand	1065	
5	Sandstone, light gray, medium grained 1065-1067, very fine to fine grained 1067-1070; rare amounts of medium gray shale	1065	1070
5	Sandstone, light gray and common rose quartz, fine to medium grained, sub-angular, well sorted	1070	1075

THICKNESS FEET	DESCRIPTION OF STRATA	DEPTH IN FEET	
1	Sandstone, similar to 1070-1075, but chiefly rose quartz	1075	1076
1	No samples	1076	1077
4	Sandstone, like samples at 1070-1075	1077	1081
4	Sandstone, similar to samples at 1070-1075 but very rare rose quartz	1081	1085
2.5	Sandstone, light gray, fine to medium grained, with small fragments of coal(?) 1085-1086 and 1087-1087.5	1085	1087.5
8.5	Sandstone, light gray to white, fine to medium grained, well sorted	1087.5	1096
8	Sandstone, light gray and pinkish, fine to medium grained, well sorted, with rare medium gray shale; some coal 1099-1102	1096	1104
.5	Sandstone, grayish pink, very fine to medium grained with common shale fragments	1104	1104.5
6.5	Sandstone, light gray, fine to coarse grained, becoming coarser 1107-1111, well sorted, many frosted and rounded grains 1108-1109 and 1110-1111	1104.5	1111
6	Sandstone, light gray, fine grained, with common shale fragments; sample has a "salt and pepper" appearance	1111	1117
	Bottom of Upper Connequenessing sandstone		1117
3	Sandstone and shale, approximately 50 per cent of each; sandstone is light gray, fine grained; shale is dark gray, silty	1117	1120
4.5	Shale, dark red and dark gray, silty, moderate amount of muscovite	1120	1124.5
5.5	Shale, dark gray, silty	1124.5	1130
24	Shale, dark gray and medium red, some sand 1130-1136 and 1148-1154; few coal fragments 1142-1148; sample predominantly dark gray to black 1148-1154	1130	1154
39	Shale, predominantly dark gray with occasional pieces medium red, silty, some sandstone 1154-1168; sample is blackish gray 1190-1193	1154	1193
5	No samples	1193	1198
17	Shale, dark gray, with interbedded sandstone, light gray, very fine grained, indurated; samples are predominantly shale	1198	1215
11	Shale, dark gray, sandy, with common dark gray sandstone, medium to coarse grained, indurated; some quartz grains to 1 mm. rounded, and frosted; medium red shale 1221-1226	1215	1226
6	Shale, same as in 1215-1226, with increasing amounts red shale; about 10 per cent of sample is sand, white, fine grained, angular to sub-angular, with a few quartz grains to 3 mm.	1226	1232
	POCONO GROUP, 558 FEET (1232-1790)		
	Top of Big Injun sand	1232	
13	Sandstone, light gray to white, predominantly fine to medium grained, with occasional grains of quartz to 1 mm., frosted and rounded; samples contain about 10 per cent sandy shale 1232-1242; a few reddish brown, rounded quartz grains. *Greenbriar-Loyalhanna* not found in samples	1232	1245
7	Sandstone, rose and white, loose, fine to medium grained	1245	1252
7	Sandstone, like 1245-1252, but indurated, some siltstone, sandy, with common muscovite and bronze mica	1252	1259
13	Sandstone, light gray to white, fine to medium grained common muscovite 1265-1272	1259	1272
6	Sandstone, like 1259-1272, with 50 per cent black shale and coal(?)	1272	1278
30	Sandstone, as in 1272-1278, with some black shale (cavings ?) in decreasing amounts toward base	1278	1308
12	Sandstone, light gray to white, fine to medium grained with 20 to 30 per cent dark gray silty shale containing carbonaceous plant fragments; some sandstone is loose	1308	1320
25	Sand, light gray to white, loose, sub-angular, fine to medium grained, fairly well sorted; occasional greenish gray and grayish black sandstone aggregate 1330-1345	1320	1345
1+	Sandstone, same as 1320-1345	1345(?)	?
16	Sand, light gray to white, loose, fine to medium grained, sub-angular, common greenish gray and grayish black sandstone aggregate containing abundant muscovite	1349	1365

THICKNESS FEET	DESCRIPTION OF STRATA	DEPTH IN FEET	
15	Sand, light gray and white, loose, very fine to fine grained 1365-1367, fine to medium grained 1367-1380; common rose quartz 1371-1380, sub-angular, occasional muscovite	1365	1380
35	Sandstone, light gray to white, loose and in fine grained aggregates with common fine grained greenish gray sandstone; much of sandstone has a white, ashy appearance; some dark gray sandy shale 1390-1415	1380	1415
4.5	Sand, light brownish gray, loose, fine to medium grained, rather well rounded, few grains to 1 mm.	1415	1419.5
8.5	Sand, light gray to white, loose, fine to medium grained; much of the sand has a white, ashy appearance as in 1380-1415	1419.5	1428
	Bottom of Big Injun sand		1428
17	Shale, medium gray and pale red, silty, common muscovite, with some very fine grained sandstone 1428-1434 and 1440-1445	1428	1445
6	Sandstone, light gray to white (ashy appearance) mostly loose, very fine to fine grained with some silty shale	1445	1451
5(?)	Sandstone and shale, approximately 50 per cent of each, sandstone is light gray, very fine grained with occasional grains to 1 mm.; shale is dark gray and pale red, irregularly silty	1451	1456(?)
1+	Sandstone and shale, like 1451-1456	1456	?
33	Shale, medium gray and pale red	1462	1495
58	Shale and sandstone, interbedded, predominantly shale 1522.5-1548; shale is dark gray and pale red; sandstone, light gray, very fine grained (in places almost silt size)	1495	1553
4	No samples	1553	1557
	Top of Squaw sand	1557	
4.5	Sandstone, light gray to greenish gray, very fine to fine grained, irregularly loose; few frosted and rounded quartz grains 1559-1561.5	1557	1561.5
1.5	No samples	1561.5	1563
8	Sandstone, light gray, fine grained, with common dark gray to black shale fragments 1563-1565; sandstone at 1570-1571 is very fine grained, white, loose	1563	1571
9	Shale, dark gray and pale red, silty	1571	1580
1	Shale and sandstone, approximately 50 per cent of each; shale as in 1571-1580, sandstone is light gray, very fine grained	1580	1581
5	Sandstone, light gray, very fine grained, with some dark gray and pale red silty shale, white, ashy appearance 1584-1586	1581	1586
4	Sandstone, light gray and brownish gray, very fine grained	1586	1590
4	Sandstone, grayish brown, very fine grained	1590	1594
5	Sandstone and shale, approximately 50 per cent of each, shale is dark gray, irregulary silty; sandstone is brownish gray, very fine grained	1594	1599
	Bottom of Squaw sand		1599
6	Shale, dark gray and pale red, irregularly silty	1599	1605
1+	Shale, dark gray, rare pale red fragments	1605	?
47	Shale, dark gray, rare pale red fragments	1610	1657
6	Shale and sandstone, about 70 per cent shale; sandstone is light gray, fine grained; shale is dark gray and pale red, sandy, irregularly calcareous	1657	1663
6	Shale and sandstone, similar to 1657-1663, but about 50 per cent of each	1663	1669
70	Shale, very sandy and silty, dark gray with a few pale red shale fragments and some interbedded siltstone	1669	1739
6	Shale, dark gray, silty; rare pale red shale	1739	1745
31	Shale, dark gray and pale red	1745	1776
	Top of Murrysville sand	1776	
6	Shale and sandstone, sandstone about 30 per cent of sample; shale is dark to medium gray, rarely pale red; sandstone is light gray, fine grained, with some muscovite	1776	1782
2	Shale and sandstone, same as 1776-1782 but approximately 50 per cent of each	1782	1784
6	Sandstone and shale, about 65 per cent sandstone; sandstone is light gray and pale red, fine grained and highly micaceous; shale is medium gray	1784	1790
	Bottom of Murrysville sand		1790

THICKNESS FEET	DESCRIPTION OF STRATA	DEPTH IN FEET	
	UPPER DEVONIAN SERIES, 547+ FEET (1790-2337)		
	CONEWANGO GROUP 545 FEET (1790-2335)		
6	Shale, medium gray, irregularly sandy, highly micaceous	1790	1796
5	Siltstone and shale, 50 per cent siltstone 1796-1800, 65 per cent siltstone 1800-1801; shale is medium gray, some pale red; siltstone is light gray to white	1796	1801
8	Siltstone and shale, as in 1796-1801 in varying percentages: 90 per cent shale 1801-1806, 50 per cent shale 1806-1808, 25 per cent shale 1808-1809	1801	1809(?)
4	Siltstone, light gray, with some pale red shale 1811-1813	1809(?)	1813
1+	Siltstone and shale, approximately 50 per cent of each, same as 1801-1809	1813	?
1+	Shale, medium gray, slightly sandy, with common muscovite and rare siltstone	?	1819
1+	Shale, medium gray, with some red shale, common muscovite	?	
1+	Shale, same as above	?	1829
1	Shale and siltstone, light gray	1829	1830
16	Shale, medium gray, with rare pale red shale	1830	1846
19	Shale and siltstone in varying amounts: 80 per cent shale 1846-1858, 60 per cent shale 1858-1865; predominantly light gray, highly micaceous, common red 1850-1865	1846	1865
20	Sbale, medium gray, silty, common muscovite, rare red sbale 1871-1885	1865	1885
21	Shale, same as 1865-1885, rare red shale, and rare light gray to white and pale reddish sand	1885	1906
26	Shale, pale red and light gray, 60 per cent red, highly micaceous with rare fine grained sandstone	1906	1932
2	Shale, light brown with common grayish brown sandstone	1932	1934
	Top of Gantz sand	1934	
9	Sandstone and shale, sandstone in increasing amounts as follows: 50 per cent 1934-1937, 75 per cent 1937-1940, 85 per cent 1940-1943; sandstone is grayish brown, light to medium gray, grayisb green, becoming predominantly gray 1937-1943, grains up to 2 mm.; shale is light brown and medium gray	1934	1943
16	Sandstone, same as in 1934-1943, but predominantly light gray to white, fine to medium grained with some milky to clear and rose colored, sub-angular quartz grains 1948-1952; decreasing grain size 1952-1957; rare light to medium gray shale 1945-1952	1943	1959
	Bottom of Gantz sand		1959
11	Shale and sandstone, shale 75 per cent of sample 1958-1964, 65 per cent 1964-1978; shale is medium gray and pale red, higbly micaceous; sandstone is medium gray, fine to medium grained	1959	1970
	Top of Fifty Foot sand	1970	
4	Sandstone and shale, sandstone 50 per cent of sample 1970-1971, 80 per cent 1971-1974; sandstone is light gray and grayish brown, predominantly fine grained with some well rounded, frosted sand grains to 2 mm.; shale, grayish brown and medium gray	1970	1974
9	Sandstone, light gray and grayish brown, fine grained, more indurated and highly micaceous 1976-1977, with rare shale fragments; driller records "gas and water" at 1983	1974	1983
2	No samples	1983	1985
4	Sandstone, light gray, fine to coarse grained with common frosted grains to 2 mm.; sandstone is subangular	1985	1989
3	Sandstone, light gray, very fine to fine grained, angular to subangular, with some light gray and brownish gray shale fragments	1989	1992
1.5	Sandstone, fine to medium grained, generally rusty colored (contamination ?)	1992	1993.5
4.5	Sandstone, light brownish gray, fine grained, angular to subangular, well sorted	1993.5	1998
3.5	Sandstone, white, some rusty colored as in 1992-1993.5, fine to medium grained, not so well sorted as in 1993.5-1998	1998(?)	2001.5
5.5	Sandstone, light gray to white 2001.5-2005, rusty colored 2005-2007, medium grained, subangular, fairly well sorted	2001.5	2007

THICKNESS FEET	DESCRIPTION OF STRATA	DEPTH IN FEET	
.5(?)	Sandstone, grayish brown and medium gray, fine grained, rather well sorted	2007	2007.5
.5(?)	Sandstone, "salt and pepper" appearance, fine grained, with greenish gray, fine grained sandstone aggregates	2007.5	2008
.5	Sandstone, grayish brown, fine grained, fairly well sorted	2008	2008.5
1.5	Sandstone, grayish brown, light gray and white, fine to medium grained	2008.5	2010
6	Sandstone, hrownish gray and light gray, fine to medium grained, fairly well sorted	2010	2016
	Bottom of Fifty Foot sand		2016
13	Shale, medium to dark gray, with some fine grained sand; occasional grains to 2 mm. at 2019-2029	2016	2029
5	Shale, medium gray, rarely light red, finely micaceous	2029	2034
61	Shale, same as 2029-2034, with rare medium gray, fine grained sandstone, which becomes more common 2085-2095	2034	2095
	Top of Lower Nineveh	2095	
4	Sandstone and shale, about 30 per cent shale; sandstone is white to yellowish, fine to medium grained, with some large clear and milky, irregularly frosted quartz flakes; shale is light to medium gray	2095	2099
5	Sandstone and shale as follows: 75 per cent sandstone 2099-2100, 40 per cent sandstone 2100-2101.5, 70 per cent sandstone 2101.5-2103; sandstone is fine to medium grained, light gray, angular to subangular; shale is medium gray 2099-2100, dark brown 2100-2104	2099	2104
5(?)	Sandstone, light gray to white, clear, fine to medium grained, fairly well sorted, subangular, clear to milky with some dark gray shale	2104	2109(?)
3	Sandstone, light gray, very fine to fine grained 2109-2111, fine grained 2111-2112, well sorted, rare muscovite; driller show of oil at 2111	2109	2112
3(?)	Sandstone, light gray, appearance of granulated sugar, fine to medium grained, fairly well sorted, rare muscovite	2112	2115(?)
5(?)	Sandstone and shale, 50 per cent of each; sandstone is light gray, fine grained, indurated; shale is dark to medium gray, finely micaceous	2115(?)	2120
	Bottom of Lower Nineveh		2120
16	Shale, medium gray, finely micaceous, with a few fragments of red shale; possible fossil fragment(?)	2120	2136
(?)	Two samples, one depth 2136, one depth not given, hoth are same as in 2120-2136	2136	2147
	Top of Gordon Stray sand	2147	
1+	Sandstone and shale, 60 per cent sandstone, sandstone is grayish green, fine grained with some rare well rounded medium size grains; shale is medium gray to grayish green, finely micaceous	2147	?
5	Sandstone and shale, predominantly sandstone which is light gray to greenish gray, fine grained, subangular to rounded, with a few medium size frosted grains; shale is medium gray	2150	2155
	Bottom of Gordon Stray sand		2155
8	Shale and sandstone, chiefly shale which is medium gray with some red, finely micaceous; sandstone is light gray and greenish gray, fine grained, micaceous	2155	2163
	Top of Gordon sand	2163	
4	Sandstone and shale as follows: 50 per cent sandstone 2163-2165, 65 per cent sandstone 2165-2167; sandstone is light gray, medium grained to coarse, clean, subangular with some rounded and frosted grains to 2 mm.; shale as in 2155-2163	2163	2167
2	Sandstone, similar to 2163-2167 but generally more coarse with 25 per cent shale as in 2155-2163	2167	2169
8	Sandstone, grayish brown, fine grained 2169-2172 becoming fine to medium grained 2172-2177; fairly well sorted, rare mica, occasional dark gray to black shale	2169	2177
9	Sandstone, white 2177-2181 and 2184-2186, light brown 2181-2184; generally very clear, medium to coarse grained, fairly well sorted, subrounded to subangular	2177	2186

THICKNESS FEET	DESCRIPTION OF STRATA	DEPTH IN FEET	
8	Sandstone, light gray, very coarse to pebbly, poorly sorted, some pebbles are frosted and well rounded, some dark gray shale 2193-2194	2186	2194
2	Sandstone, light gray, fine to medium grained, fairly well sorted, subangular	2194	2196
6	Sandstone, grayish brown, fine to medium grained with a few rounded quartz pebbles	2196	2202
6	Sandstone, white, generally medium grained, but fine grained 2207-2208	2202	2208
	Bottom of Gordon sand		2208
2	Shale and sandstone, shale 65 per cent, medium gray; sandstone is light gray, fine grained with occasional muscovite	2208	2210
8	Shale and sandstone, approximately 50 per cent of each; similar to 2208-2210 but sandstone somewhat looser	2210	2218
5	Sandstone and shale, 75 per cent sandstone; sandstone is white 2218-2221, rusty colored 2221-2223, fine grained, irregularly loose, subangular; common mica; shale is medium gray	2218	2223
4	Shale, medium gray and red; slightly sandy, finely micaceous	2223	2227
1+	Shale, same as 2223-2227	2229(?)	?
1+	Shale, same as 2223-2227, rare pyrite	?	2242
6	Shale, same as 2223-2227	2242	2248
1+	Shale, same as 2223-2227, increasing amounts of red shale, occasional rounded quartz grains to 1 mm.	2248	?
	Top of Fourth sand	2253(driller)	
(?)	Sandstone and shale, five samples, depth not given, approximately 65 per cent sandstone which is light gray to white, very fine to medium grained with a few subangular to rounded grains to 2 mm.; shale is medium gray, finely micaceous	?	2259
3	Sandstone and shale, approximately 50 per cent of each, same as above	2259	2262
5	Sandstone, light gray and grayish brown, very fine to fine grained, well sorted	2262	2267
2	Shale, medium gray, finely micaceous with some fine grained sandstone	2267	2269
6	Shale and sandstone, 50 per cent of each 2269-2270, 65 per cent shale 2269-2275; lithology as in 2267-2269	2269	2275
	Bottom of Fourth sand		2275
1+	Shale, medium to dark gray with occasional red fragments, sandy, common pyrite	2275	?
25	Shale, medium gray, silty, rare red shale; one fragment at 2280-2285 effervesced in hydrochloric acid	2280	2305
10	Sandstone and shale, 80 per cent shale 2305-2310, 65 per cent shale 2310-2315, shale is medium gray, rarely red; sandstone is light gray to white, very fine to fine grained	2305	2315
	Top of Fifth sand	2315	
6	Sandstone and shale, 80 per cent sandstone 2315-2319, 50 per cent sandstone 2319-2321; lithology of sandstone and shale same as in 2305-2315	2315	2321
4	Sandstone, light gray to white, mostly very fine grained with some rounded and frosted quartz grains; shale is predominantly dark gray with some red	2321	2325
5	Sandstone, white, loose, very fine grained, well sorted with a few large quartz slivers, occasional mica	2325	2330
2(?)	Siltstone, chalky white, very fine grained	2330	2332(?)
3	Sandstone, light gray to white, somewhat loose, very fine to fine grained, subangular	2332	2335
	Bottom of Fifth sand		2335
	CONNEAUT GROUP, 2+ FEET (2335-2337)		
2	Shale, dark to medium gray, silty, finely micaceous, with some very fine grained sandstone	2335	2337
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Oil Analyses*†

by

U. S. BUREAU OF MINES

SAMPLE 48044

Venice field		Pennsylvania
Fourth sand, Upper Devonian	*South Penn Oil Co.*	Washington County
2,276-2,295 feet	*Ella Barnes No. 1*	Cecil Twp.

GENERAL CHARACTERISTICS

Specific gravity, 0.812 — A.P.I. gravity, 42.8°

Sulfur, per cent, 0.07 — Color, N.P.A. No. 5

Saybolt Universal viscosity at 100°F., 42 scc.

DISTILLATION, BUREAU OF MINES ROUTINE METHOD

FRACTION NO.	CUT °C.	AT °F.	PER CENT	SUM, PER CENT	SP. GR., 60/60°F.	°A.P.I., 60°F.	C.I.	ANILINE POINT °C.	S.U. VISC., 100°F.	CLOUD TEST, °F.
Distillation at atmospheric pressure, 750 mm. First drop, 29°C. (84°F.)										
1	50	122	1.2	1.2	0.646	87.5	—	58.7		
2	75	167	1.9	3.1						
3	100	212	3.3	6.4	.696	71.8	10	60.8		
4	125	257	5.3	11.7	.725	63.7	15	58.7		
5	150	302	5.5	17.2	.746	58.2	17	58.7		
6	175	347	5.7	22.9	.760	54.7	17	61.8		
7	200	392	5.7	28.6	.773	51.6	17	66.1		
8	225	437	5.7	34.3	.784	49.0	16	72.4		
9	250	482	6.4	40.7	.795	46.5	16	76.7		
10	275	527	6.7	47.4	.807	43.8	17	80.7		
Distillation continued at 40 mm.										
11	200	392	3.2	50.6	0.823	40.4	21	84.9	40	20
12	225	437	6.4	57.0	.831	38.8	21	89.4	44	35
13	250	482	5.8	62.8	.840	37.0	22	93.3	53	55
14	275	527	5.4	68.2	.852	34.6	24	98.2	68	75
15	300	572	6.2	74.4	.859	33.2	25	103.3	105	90
Residuum			23.3	97.7	0.891	27.3	—	123.9	—	—

Carbon residue of residuum, 2.0 per cent; carbon residue of crude, 0.5 per cent.

APPROXIMATE SUMMARY

	PER CENT	SP. GR.	°A.P.I.	VISCOSITY
Light gasoline	6.4	0.672	79.1	
Total gasoline and naphtha	28.6	0.734	61.3	
Kerosene distillate	18.8	.796	46.3	
Gas oil	10.6	.829	39.2	
Nonviscous lubricating distillate	12.6	.837–.858	37.6–33.4	50–100
Medium lubricating distillate	3.8	.858–.862	33.4–32.7	100–200
Viscous lubricating distillate	—	—	—	Above 200
Residuum	23.3	.891	27.3	
Distillation loss	2.3			

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† Crude oils from sands of the Conewango group, Allegheny and Washington Counties, Pennsylvania.

SAMPLE 48045

McDonald field — Pennsylvania

Gordon sand, Upper Devonian — *South Penn Oil Co.* — Washington County

2,394-2,407 feet — *W. B. Moorhead No. 5* — Cecil Twp.

GENERAL CHARACTERISTICS

Specific gravity, 0.800 — A.P.I. gravity, 45.4°

Sulfur, per cent, 0.06 — Color, N.P.A. No. 4½

Saybolt Universal viscosity at 100°F., 37 sec.

DISTILLATION, BUREAU OF MINES ROUTINE METHOD

FRACTION NO.	CUT °C.	AT °F.	PER CENT	SUM, PER CENT	SP. GR., 60/60°F.	°A.P.I., 60°F.	C.I.	ANILINE POINT °C.	S.U. VISC., 100°F.	CLOUD TEST, °F.
Distillation at atmospheric pressure, 750 mm. First drop, 41°C. (106°F.)										
1	50	122	.4	.4	0.655	84.5	—	—		
2	75	167	1.7	2.1						
3	100	212	4.1	6.2	.699	70.9	11	61.2		
4	125	257	7.7	13.9	.730	62.3	17	59.4		
5	150	302	8.2	22.1	.748	57.7	18	59.6		
6	175	347	8.1	30.2	.763	54.0	18	62.5		
7	200	392	7.4	37.6	.775	51.1	18	67.1		
8	225	437	7.1	44.7	.785	48.8	17	72.5		
9	250	482	7.2	51.9	.795	46.5	16	77.6		
10	275	527	6.8	58.7	.809	43.4	18	81.2		
Distillation continued at 40 mm.										
11	200	392	4.7	63.4	0.822	40.6	20	85.6	40	20
12	225	437	6.1	69.5	.828	39.4	19	89.5	45	35
13	250	482	4.7	74.2	.840	37.0	22	93.8	54	55
14	275	527	4.6	78.8	.849	35.2	23	—	71	70
15	300	572	4.7	83.5	.857	33.6	24	104.2	115	90
Residuum			15.8	99.3	0.888	27.9		124.5		

Carbon residue of residuum, 1.3 per cent; carbon residue of crude, 0.2 per cent.

APPROXIMATE SUMMARY

	PER CENT	SP. GR.	°A.P.I.	VISCOSITY
Light gasoline	6.2	0.684	75.4	
Total gasoline and naphtha	37.6	0.742	59.2	
Kerosene distillate	21.1	.796	46.3	
Gas oil	10.8	.827	39.6	
Nonviscous lubricating distillate	10.1	.835	38.0	50–100
Medium lubricating distillate	3.9	.854	34.2	100–200
Viscous lubricating distillate	—	—	—	Above 200
Residuum	15.8	.888	27.9	
Distillation loss	0.7			

SAMPLE 48046

McDonald field — Pennsylvania

Fifth sand, Upper Devonian — *South Penn Oil Co.* — Allegheny County

2,143-2,162 feet — *John McD. Glenn No. 3 (P.I.)* — North Fayette Twp.

GENERAL CHARACTERISTICS

Specific gravity, 0.795 — A.P.I. gravity, 46.5°

Sulfur, per cent, 0.07 — Color, N.P.A. No. 4½

Saybolt Universal viscosity at 100°F., 38 sec.

DISTILLATION, BUREAU OF MINES ROUTINE METHOD

FRACTION NO.	CUT °C.	AT °F.	PER CENT	SUM, PER CENT	SP. GR., 60/60°F.	°A.P.I., 60°F.	C.I.	ANILINE POINT °C.	S.U. VISC., 100°F.	CLOUD TEST, °F.
Distillation at atmospheric pressure, 750 mm. First drop, 28°C. (82°F.)										
1	50	122	1.8	1.8	0.632	92.4	—	—		
2	75	167	3.2	5.0	.664	81.6	4.6	63.2		
3	100	212	3.7	8.7	.701	70.4	12	61.0		
4	125	257	8.1	16.8	.724	63.9	14	59.2		
5	150	302	8.0	24.8	.743	58.9	16	59.8		
6	175	347	7.4	32.2	.758	55.2	16	62.7		
7	200	392	7.2	39.4	.770	52.3	15	67.3		
8	225	437	6.8	46.2	.781	49.7	15	72.9		
9	250	482	6.7	52.9	.793	46.9	15	77.3		
10	275	527	6.9	59.8	.804	44.5	16	81.5		
Distillation continued at 40 mm.										
11	200	392	3.9	63.7	0.819	41.3	19	84.8	41	20
12	225	437	5.6	69.3	.831	38.8	21	89.3	44	30
13	250	482	4.7	74.0	.838	37.4	21	93.5	53	50
14	275	527	4.5	78.5	.846	35.8	22	98.4	68	70
15	300	572	4.3	82.8	.858	33.4	24	103.5	105	90
Residuum			16.2	99.0	0.888	27.9		124.4		

Carbon residue of residuum, 1.2 per cent; carbon residue of crude, 0.2 per cent.

APPROXIMATE SUMMARY

	PER CENT	SP. GR.	°A.P.I.	VISCOSITY
Light gasoline	8.7	0.673	78.8	
Total gasoline and naphtha	39.4	0.731	62.1	
Kerosene distillate	20.4	.793	46.9	
Gas oil	10.2	.825	40.0	
Nonviscous lubricating distillate	10.1	.835–.856	38.0–33.8	50–100
Medium lubricating distillate	2.7	.856–.864	33.8–32.3	100–200
Viscous lubricating distillate	—	—	—	Above 200
Residuum	16.2	.888	27.9	
Distillation loss	1.0			

SAMPLE 48047

McDonald field — Pennsylvania

Fifth sand, Upper Devonian — *E. H. Jenning Bros. Co.* — Allegheny County

2,282 feet (bottom) — *J. J. Mathews No. 1* — Fayette Twp.

GENERAL CHARACTERISTICS

Specific gravity, 0.805 — A.P.I. gravity, 44.4°

Sulfur, per cent, 0.06 — Color, N.P.A. No. 4½

Saybolt Universal viscosity at 100°F., 39 sec.

DISTILLATION, BUREAU OF MINES ROUTINE METHOD

FRACTION NO.	CUT °C.	AT °F.	PER CENT	SUM, PER CENT	SP. GR., 60/60°F.	°A.P.I., 60°F.	C.I.	ANILINE POINT °C.	S.U. VISC., 100°F.	CLOUD TEST, °F.
Distillation at atmospheric pressure, 750 mm. First drop, 57°C. (135°F.)										
1	50	122								
2	75	167	1.3	1.3	0.691	73.3	—	63.6		
3	100	212	3.4	4.7						
4	125	257	7.4	12.1	.724	63.9	14	61.0		
5	150	302	7.7	19.8	.741	59.5	15	60.7		
6	175	347	6.9	26.7	.757	55.4	15	63.9		
7	200	392	6.8	33.5	.767	53.0	14	68.2		
8	225	437	6.8	40.3	.779	50.1	14	73.0		
9	250	482	6.7	47.0	.791	47.4	14	76.6		
10	275	527	8.0	55.0	.804	44.5	16	81.2		
Distillation continued at 40 mm.										
11	200	392	3.3	58.3	0.821	40.9	20	86.3	40	20
12	225	437	6.0	64.3	.826	39.8	19	89.4	44	30
13	250	482	5.8	70.1	.836	37.8	20	94.9	54	50
14	275	527	5.5	75.6	.846	35.8	22	99.8	73	70
15	300	572	6.0	81.6	.855	34.0	23	104.4	125	90
Residuum			17.7	99.3	0.887	28.0		125.7		

Carbon residue of residuum, 1.4 per cent; carbon residue of crude, 0.3 per cent.

APPROXIMATE SUMMARY

	PER CENT	SP. GR.	°A.P.I.	VISCOSITY
Light gasoline	4.7	0.691	73.3	
Total gasoline and naphtha	33.5	0.739	60.0	
Kerosene distillate	21.5	.792	47.2	
Gas oil	9.9	.826	39.8	
Nonviscous lubricating distillate	11.0	.832–.850	38.6–35.0	50–100
Medium lubricating distillate	5.7	.850–.860	35.0–33.0	100–200
Viscous lubricating distillate	—	—	—	Above 200
Residuum	17.7	.887	28.0	
Distillation loss	0.7			

SAMPLE 48048

Venice field — Pennsylvania

Fifty foot sand, Upper Devonian — *South Penn Oil Co.* — Washington County

2,020-2,049 feet — *Moore Heirs No. 1* — Cecil Twp.

GENERAL CHARACTERISTICS

Specific gravity, 0.792 — A.P.I. gravity, 47.2°

Sulfur, per cent, 0.04 — Color, N.P.A. No. 2½

Saybolt Universal viscosity at 100°F., 36 sec.

DISTILLATION, BUREAU OF MINES ROUTINE METHOD

FRACTION NO.	CUT °C	AT °F	PER CENT	SUM, PER CENT	SP. GR., 60/60°F.	°A.P.I., 60°F.	C.I.	ANILINE POINT °C.	S.U. VISC., 100°F.	CLOUD TEST °F.
Distillation at atmospheric pressure, 750 mm. First drop, 50°C. (122°F.)										
1	50	122								
2	75	167	1.3	1.3	0.693	72.7	—	62.3		
3	100	212	3.2	4.5						
4	125	257	7.3	11.8	.726	63.4	15	59.8		
5	150	302	8.9	20.7	.745	58.4	17	61.2		
6	175	347	8.9	29.6	.759	54.9	16	64.3		
7	200	392	10.0	39.6	.771	52.0	16	69.2		
8	225	437	10.7	50.3	.782	49.5	15	77.6		
9	250	482	8.5	58.8	.793	46.9	15	74.3		
10	275	527	9.3	68.1	.805	44.3	16	83.1		
Distillation continued at 40 mm.										
11	200	392	3.7	71.8	0.818	41.5	19	86.9	40	25
12	225	437	5.5	77.3	.825	40.0	18	91.8	44	35
13	250	482	4.5	81.8	.836	37.8	20	96.1	53	55
14	275	527	3.8	85.6	.847	35.6	22	100.3	71	75
15	300	572	3.6	89.2	.852	34.6	21	105.7	105	90
Residuum			10.0	99.2	0.887	28.0				

Carbon residue of residuum, 1.2 per cent; carbon residue of crude, 0.1 per cent.

APPROXIMATE SUMMARY

	PER CENT	SP. GR.	°A.P.I.	VISCOSITY
Light gasoline	4.5	0.693	72.7	
Total gasoline and naphtha	39.6	0.745	58.4	
Kerosene distillate	28.5	.793	46.9	
Gas oil	9.9	.824	40.2	
Nonviscous lubricating distillate	8.9	.833–.851	38.4–34.8	50–100
Medium lubricating distillate	2.3	.851–.854	34.8–34.2	100–200
Viscous lubricating distillate	—	—	—	Above 200
Residuum	10.0	.887	28.0	
Distillation loss	0.8			

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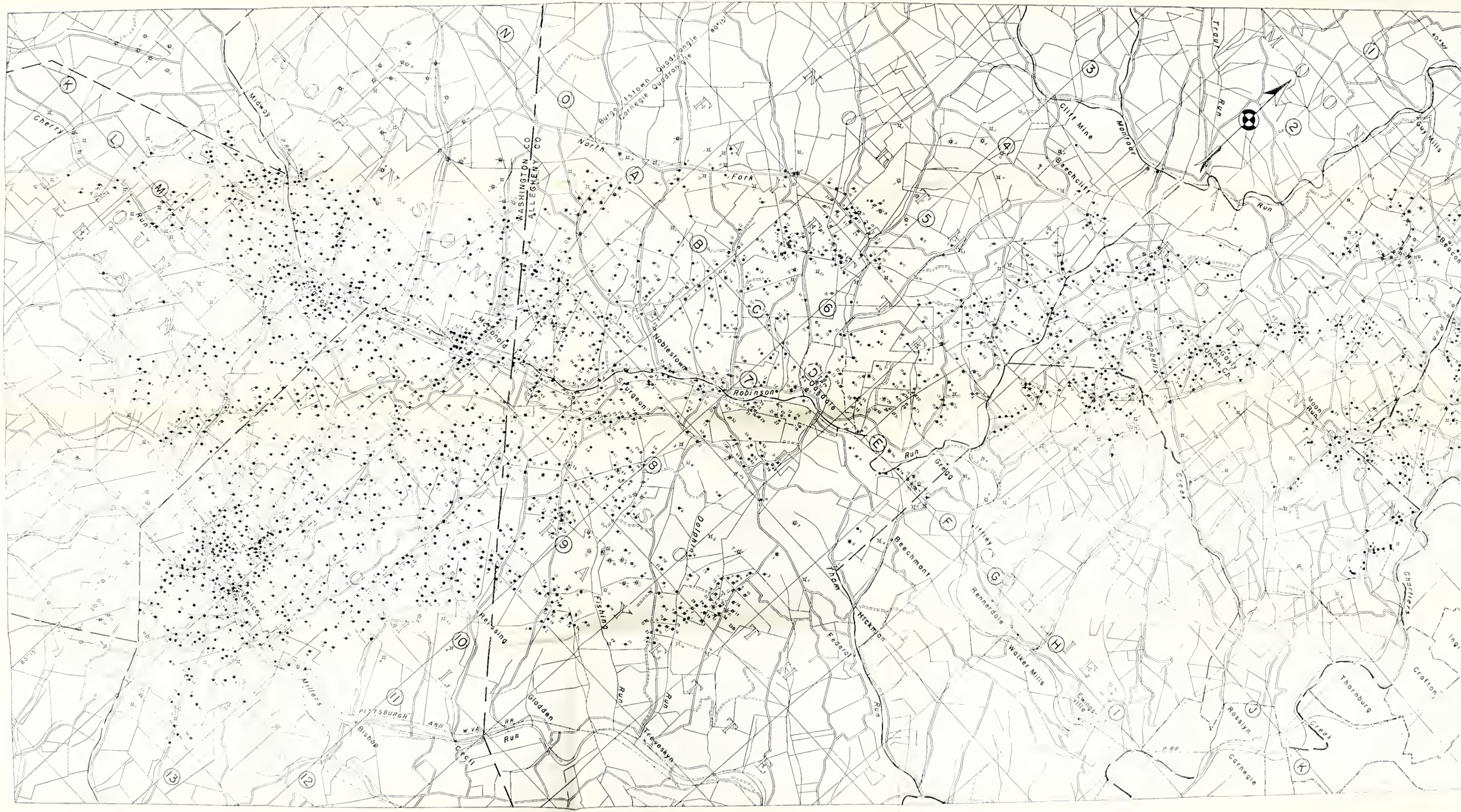
Burgettstown Quadrangle
Carnegie Quadrangle
WASHINGTON CO
ALLEGHENY CO
Midway
Cherry Run
North Fork
Cliff Mine
Montour Run
Trout Run
Guy Mills
Beacon
Beechcliff
Noblestown
Robinson
Campbells Run
Gov't Dunlop Co
Moon Run
Gregg Run
Greek
Beechmont
Thom
Hickmon
Federal
Run
Dolphin
Fishing Run
Reissing
Venice
Millers Run
Gladden
Cecil
Bishop
Treveskyn
PITTSBURGH AND W VA RR
Rennerdale
Walker Mills
Clifley
Crafton
Thornburg
Rossiyn
Carnegie
Creek
Chartiers
P RR
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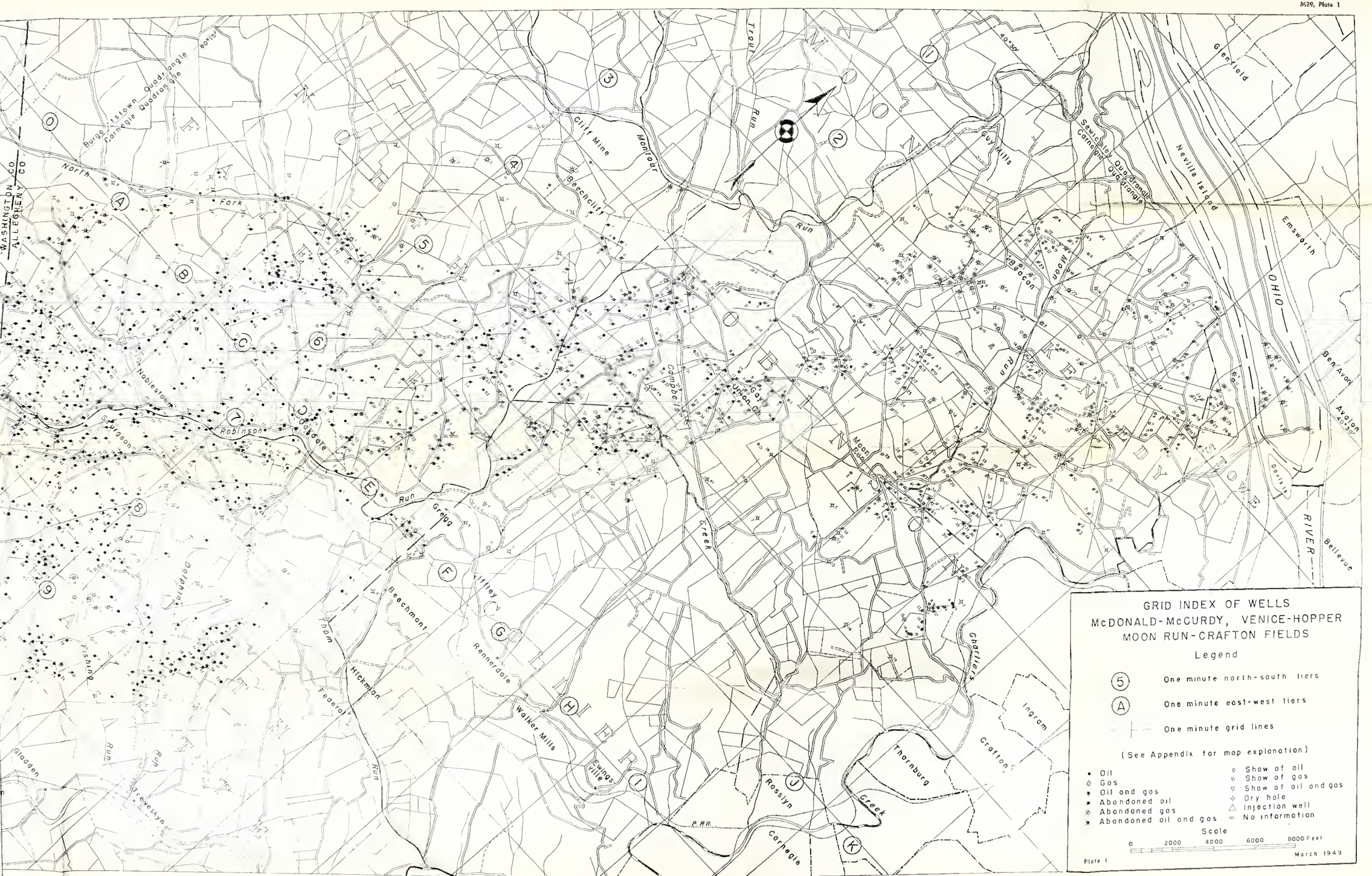
ENLOW
CRAFTON
ROSSIYN
FARMS
CRESCENT
TWP
ALLEGHENY
COUNTY


WASHINGTON CO
ALLEGHENY CO
Burgettstown Quadrangle
Carnegie Quadrangle
Sewickley Quadrangle
Ogdentown Quadrangle
North Fork
Cliff Mine
Montour
Beechcliff
Trout Run
Guy Mills
Glenfield
Neville Island
Emsworth
OHIO
Ben Avon
Avalon
Bellevue
Beacon
Moon Run
Moon Run
Campbells Run
Union Ch
Nobleston
Sturgeon
Robinson
Corapolis
Moon Run
Kennedy Township
Run
Greiga
Creek
Beechmont
Thom
Hickman
Federal
Renneredale
Walker Mills
Ewingsville
Run
Run
Gladden
Treveskyn
Run
Fishing
Dooptoo
Allfley
Chartiers
Ingram
Crafton
Thornburg
Creek
Rossiyn
P.R.R.
Carnegie
RIVER
Neville Township
Collier Township
Kennedy Township
Moon Township
Robinson Township
Crafton
Ingram
Thornburg
Rossiyn
Carnegie
Bellevue
Avalon
Ben Avon
Emsworth
Glenfield
Sewickley
Ogdentown
Burgettstown
Cliff Mine
Montour
Beechcliff
Trout Run
Guy Mills
Neville Island
Moon Run
Campbells Run
Union Ch
Nobleston
Sturgeon
Robinson
Corapolis
Greiga
Creek
Beechmont
Thom
Hickman
Federal
Renneredale
Walker Mills
Ewingsville
Run
Run
Gladden
Treveskyn
Run
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Creek
Rossiyn
P.R.R.
Carnegie
RIVER

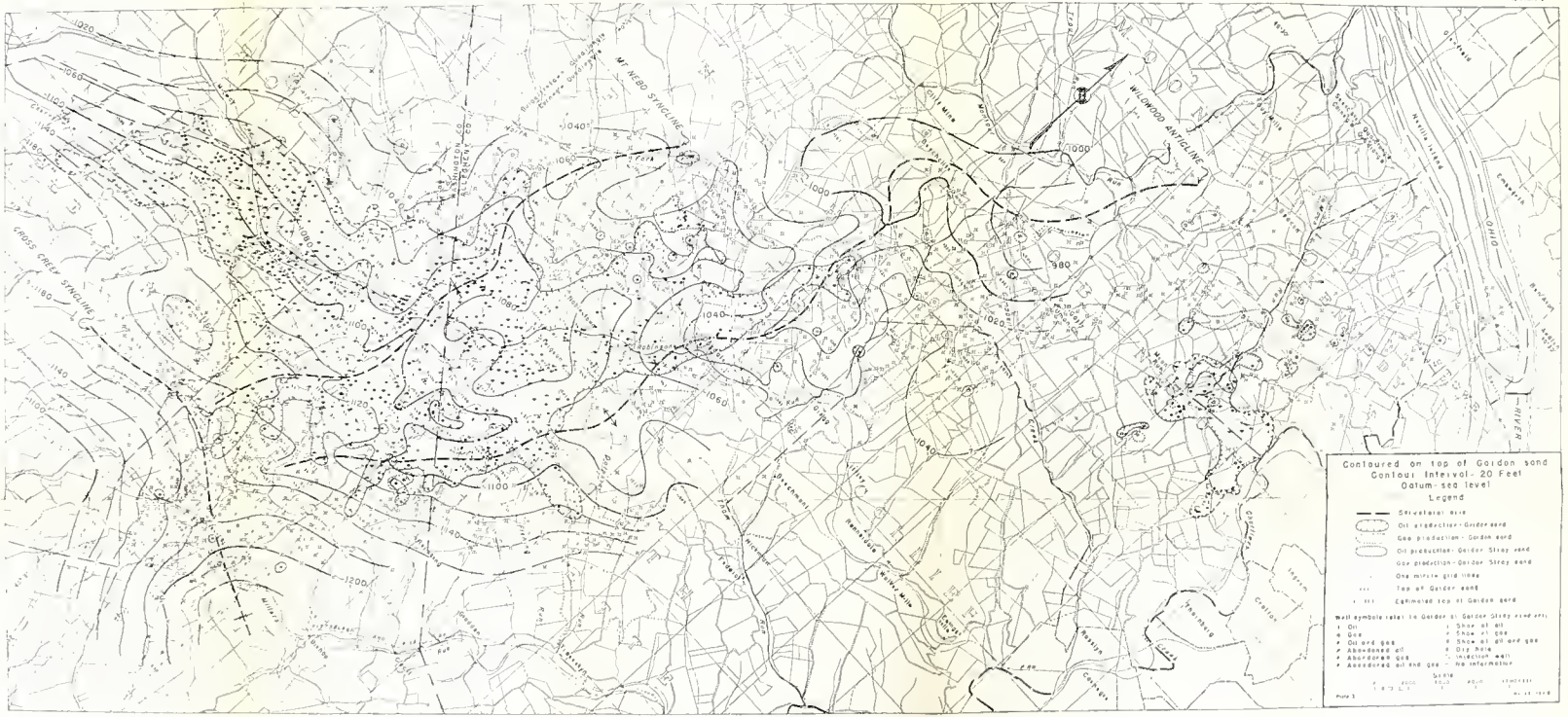


Plate 3. Structure and production map of the Gordon Stray and Gordon sands in the McDonald and adjacent oil fields.

Plate 4. Structure and production map of the Fourth sand in the Venice-Hopper and Moon Run-Crafton oil fields and vicinity.

Plate 5. Structure and production map of the Fifth sand in the McDonald and adjacent oil fields.

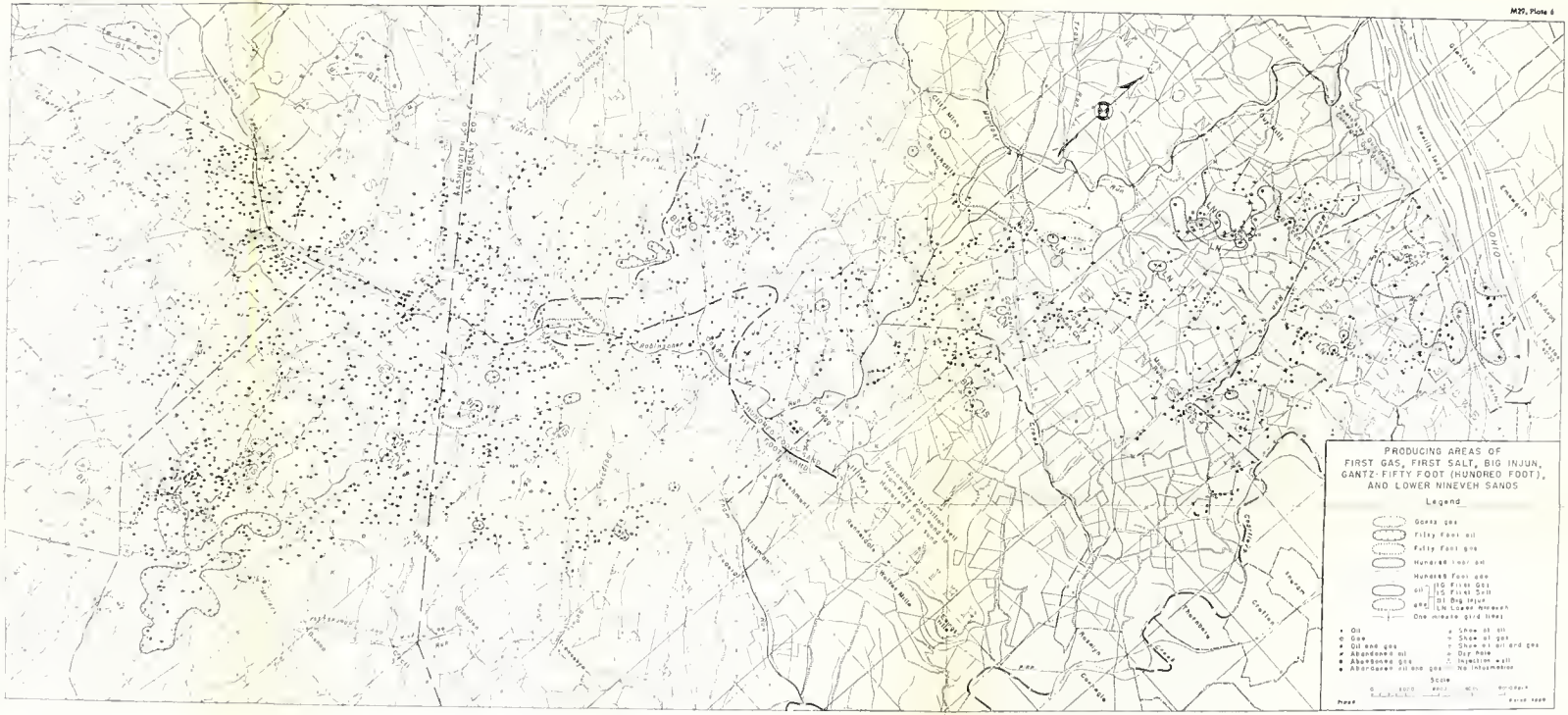
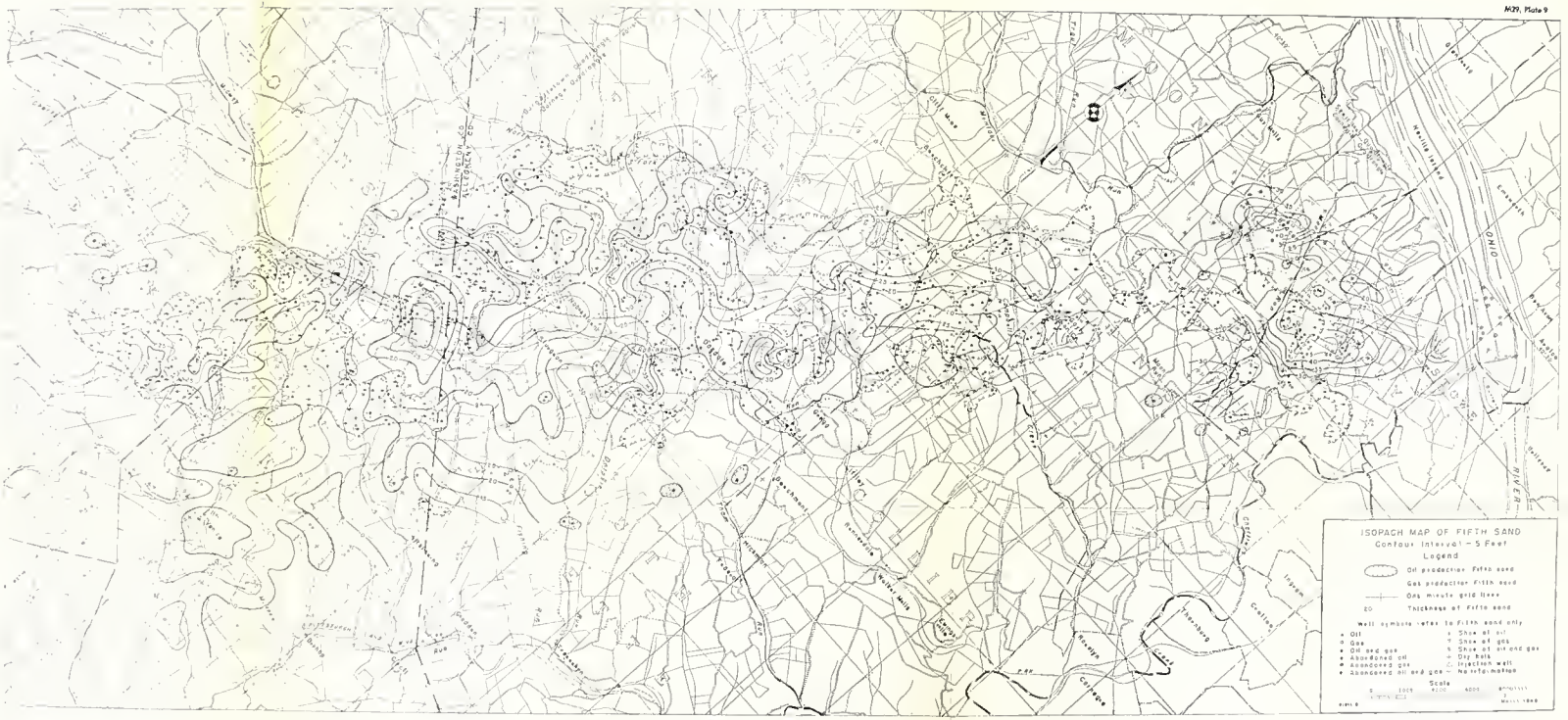


Plate 6 Producing areas of Gantz-Fifty Foot (Hundred Foot), Lower Nineveh, Mississippian and Pennsylvanian sands in the McDonald and adjacent oil fields.

Plate 8. Isopach map of Fourth sand in the Venice-Hopper oil fields.


ISOPACH MAP OF FIFTH SAND
Contour Interval — 5 Feet
Legend
Oil productive Fifth sand
Gas productive Fifth sand
One minute grid lines
20 Thickness of Fifth sand
Well symbols refer to Fifth sand only
Oil
Gas
Oil and gas
Abandoned oil
Abandoned gas
Abandoned oil and gas
Show of oil
Show of gas
Show oil and gas
Dry hole
Injection well
No information
Scale
MILES
MILES
MAGNETIC
MERIDIAN
MCDONALD
RIVER
Ohio Fuel Gas Co.
Columbia Gas & Electric Co.
Hillman
Gilkey
Cochran
Rankin
Gaskill
Kennedy
Cochran
Ingram
Gaskill
Kennedy
Cochran
Ingram
Gaskill
Kennedy
Cochran
Ingram